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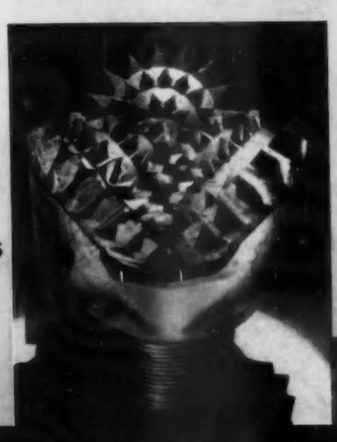

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LOOKING AHEAD

WITH THE EDITOR

THE AMERICAN PETROLEUM INSTITUTE'S annual meeting, largest convention of the oil industry, takes place in Chicago this week. Important personages from legislative, executive and technical fields are included on the comprehensive program that involves nearly 50 addresses. These will include thorough reviews of technological progress in every branch of the business, discussion of future problems and trends, coupled with comprehensive studies of economics, legislation, national defense and other factors affecting the industry—truly a representative cross-section of the industry's thoughts, difficulties and advancements. Therefore, the industry looks forward to a week in which many of its perplexing problems and many of its achievements will be discussed in open forum.

This meeting will be the most important event of the coming week, and will be featured in THE OIL WEEKLY of November 18.

It is highly desirable that some agency take upon itself the tremendous task of consolidating, briefing and reporting on the many addresses and papers that will be delivered. THE OIL WEEKLY will perform this duty for the industry. Every effort will be exerted to provide oil men with the most complete editorial coverage possible, and in a clear and interpretative style. In order to do this, THE OIL WEEKLY will take to Chicago a staff of editorial men that probably will be twice the number that will go from any other oil trade paper. A total of six men from our editorial department alone will be present at Chicago during the entire week. They will walk many a mile, listen to thousands and thousands of words, and maul the mischief out of several typewriters in promptly, accurately and thoroughly reporting the numerous developments for you.

Thus, THE OIL WEEKLY of November 18 will present an opportunity to hurriedly obtain an excellent picture of the industry's economic trends and technical problems and advancements. Several feature articles will be prepared and published. Abstracts of all production, drilling and pipe-line papers will be published, some of which will be reported in full; and special attention will be devoted to sessions at which economic, governmental or other problems of this nature will be discussed.

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THE OIL WEEKLY

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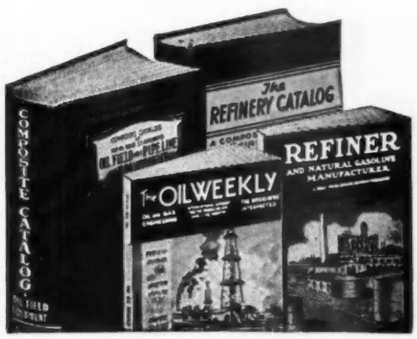

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The Oil Man's Calendar

NOV. 11-15	American Petroleum Institute, Chicago.
DEC. 5- 6	Mid-Continent Oil & Gas Association, Annual Joint Meeting of Standing Committee on State and Local Taxation, and Standing Committee on Federal Income and Excise Taxation, Tulsa.
12-13	Petroleum Electric Power Association, Baton Rouge.
16	Mid-Continent Oil & Gas Association, Annual Meeting of General Board of Directors, Tulsa Club Roof, Tulsa, Okla.
1941 FEB. 22	North Texas Oil & Gas Association, Wichita Falls.
27-28	American Petroleum Institute, Division of Production, Southwestern District, Shreveport.
MAR. 11	American Petroleum Institute, Division of Production, Spring Meeting, Pacific Coast District, Los Angeles.
APRIL 2- 4	American Association of Petroleum Geologists, Twenty-sixth Annual Meeting, Houston.
17-18	American Petroleum Institute, Division of Production, Eastern District, Pittsburgh.
23-25	Petroleum Industry Electrical Association, Tulsa.
23-25	Natural Gasoline Association of America, Dallas.

Contents « November 11, 1940

Volume 99, Number 10

The Changing Panorama..... 11

Feature Section:

Comprehensive Program for A.P.I. Annual Meeting..... 12

Well Logging by Radioactivity..... 16
BY DR. WILLIAM L. RUSSELL

Mexico and Indies Big Source of U. S. Import Increase.. 22

Latest Thoughts on Origin of Oil..... 24
BY W. A. REITER

Temporary Six-Volt Lighting Unit Cuts Production Costs..... 30

Basic Principles in Acid Treating Limes and Dolomites.. 32
BY J. B. STONE AND D. G. HEFLEY

Demountable Wire Guard Encloses Pumping Well..... 46

Outlook for Foreign Firms in Argentine Improves..... 48

Drilling Contractors' Note Book..... 52

News Section and Index..... 59

Looking Ahead With the Editor..... 4

Notes for the Equipment Buyer and User.....115

Squeaks From the Bull Wheel..... 121

Index to Advertisers.....122

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The Changing Panorama

Oil For Nazis . . .

Germany's chief problem in oil is believed by some analysts to be the need for high grade lubricants. But aviation gasoline doubtless is another major matter of concern. The British have reported that a fighting plane recently shot down over England had in its tanks gasoline of only 67 octane rating. In the United States, the new aviation gasoline specifications call for 91 and 100 octane, and the average for regular grade gasolines sold to automobile owners is about 72.

One Customer . . .

Great Britain is practically the only customer left in Europe for American makers of lubricants. In August, the United Kingdom bought 285,483 of the 290,538 barrels exported to Europe. The shipments to Britain constituted about 40 percent of all exports for the month, which aggregated 727,000 barrels.

Earnings in Oil . . .

Thanks to good results in the early months of the year, oil companies in the first 9 months of 1940 earned about 50 percent more than in the corresponding months of 1939. Reports of 10 oil companies showed aggregate 9 months' profits of $77,688,165, against $49,270,792. For the third quarter, however, the comparison was unfavorable, due to depressed gasoline prices, the same group having earned only $18,233,572, as compared with $25,090,611. Similarly, the fourth quarter will show up unfavorably with the unusually good final quarter of 1939; for the gasoline has continued weak, and year-end adjustments will be necessary because of the recently increased tax schedules.

A Few Years and Then . . .

One man who has the responsibility of looking ahead in managing the interests of thousands of small as well as large stockholders, and who advises retailers of his company's products (Alfred P. Sloan, Jr., chairman of General Motors Corporation) has analyzed the outlook this way: for 2 or 3 years, good business, because of synthetic stimulation resulting from the national defense program; the years thereafter, viewed "with great apprehension unless we can interject into our system a different type of government than that to which we have been subjected the last 7 years." Specifically, he warned dealers not to make plans beyond 2 or 3 years that might leave them "out on the limb," when adjustments are made in liquidation of the national defense program. He added (before the election) that there was no limit to what this country could do if it would pass from an economic policy aimed at dividing up what we have to one in which a bigger and better economy would be the goal.

Much Steel . . .

Steel ingot production currently is the highest on record. Mills are operating at about 96 percent of capacity. They operated at full capacity a few weeks in the middle of 1929, but capacity now is higher than then, and total production is greater.

More Jobs . . .

Employment in the United States in September, with 48,404,000 holding jobs, was only 3 percent, or a little over a million, under the 1929 peak of 49,715,000. The September figure was a million larger than a month before and 2 million above a year before. However, there remained nearly 7 millions of unemployed, or about the number of employables that have joined the labor force since 1929. At the height of the 1937 boomlet (September) there were about 5 millions unemployed.

Texas Taxes . . .

"Important Facts About Texas Oil" is the title of a 36-page booklet recently released by the Texas Mid-Continent Oil & Gas Association. The booklet contains interesting facts relating to expenditures of the oil and gas industry in Texas, the taxes it pays, and the part it plays in the economic life of the state. If every oil-producing state compiled a similar yearly report and these reports were made available to the citizens of these states, unquestionably some wild-eyed orators would find the sledding tough—as they always find it tough when they come up against a well informed public. Copies of "Important Facts About Texas Oil" can be obtained by writing the association, in the Continental Building, Dallas, Texas.

Gasoline Situation . . .

A further small withdrawal was made from gasoline stocks, whereas an addition would not have been unusual at this time of the year.

The industry last year began backing gasoline into storage as early as the second week in October, but there has not been any interruption so far this year in withdrawals from storage, with November already at hand.

In various years in the past, however, gasoline stocks have not begun to climb until around the middle of November. In 1938, for example, the low point was not passed until after the week ended November 12.

Having diminished 117,000 barrels in the week of November 2, 1940, the gasoline stocks stood at 80,774,000 barrels, but at that level they were approximately 7,000,000 barrels, or 10 percent, higher than a year previously, when they totaled 73,550,000 barrels.

Already within about 4,000,000 barrels of the 85,000,000-barrel level regarded as economically desirable as of March 31, the gasoline inventory threatens to continue a serious problem.

Crude Runs Still High . . .

Curtailment of refinery runs materially below current levels would be necessary for achieving any degree of success in correcting the gasoline situation.

The runs to stills were cut down 30,000 barrels in the week of November 2, to 3,535,000 barrels daily. But economists have calculated that average runs of 3,400,000 barrels daily in the 6 months from October 1 to March 31 would be necessary for holding gasoline stocks to the actual requirements of 85,000,000 barrels at the beginning of spring.

Comprehensive Program For A. P. I. Annual Meeting

A THOROUGH review of the technological progress in every branch of the petroleum industry and a discussion of future problems and trends, coupled with comprehensive study of economic, legislative, national defense and other factors affecting the industry, are among the many features arranged for the Twenty-First Annual Meeting of the American Petroleum Institute, to be held November 11 to 15 inclusive in the Stevens Hotel at Chicago.

The program calls for two general sessions, 7 group sessions, and approximately 100 committee meetings. In addition there will be the annual banquet of the Institute, annual meeting and banquet of the recently organized 25-Year Club, and annual banquet of the Institute of Petroleum. Although not scheduled on the program, informal receptions have been arranged for every evening, the hosts being various companies and organizations affiliated with the petroleum industry.

Two General Sessions

Six speakers of prominence will deliver addresses before the two general sessions. The first general session, to be held Wednesday afternoon, November 13, will be addressed by Institute President Axtell J. Byles, Colonel T. H. Barton, of Lion Oil and Refining Company, El Dorado, Ark., and Dr. Robert E. Wilson, oil's representative on the Council of National Defense. Speakers at the second general sessions, which will be held Thursday afternoon, November 14, will be William J. Cameron, of Ford Motor Company, Detroit; H. W. Prentis, Jr., president of the National Association of Manufacturers; and the Honorable Martin Dies, member of Congress from Texas.

Committee meetings will be held all day Monday and Tuesday, although some committees met as early as last Friday and Saturday. Other committee meetings are scheduled for Wednesday, Thursday and Friday.

Group divisional sessions will begin Tuesday afternoon and will be continued on Wednesday, Thursday and Friday. Subjects of group sessions include automotive transportation, refining, production practice, drilling, pipe line transportation, lubrication, and fuels and engines.

In accordance with tradition, no speaker will appear on the program of the annual banquet, to be held Thursday evening, November 14, in the Grand Ball Room. A program of entertainment has been arranged by the Institute.

Elections To Be Held

The Board of Councillors will meet Wednesday morning, November 13, to nominate successors to 48 of the 55 members of the Institute's Board of Directors whose terms expire this year. The board itself will elect seven directors. Members of the Institute will vote on the nominations at the first general session.

The Board of Directors will hold meetings on Tuesday, Wednesday and Thursday to conduct routine business, to elect officers, and to consider new business. The executive committee will meet on Thursday at the conclusion of the final session of the board.

Eight officers of the Institute to serve during 1941 will be elected by the Board of Directors. Officers whose terms expire are: president, Axtell J. Byles; vice president for production, George A. Hill, Jr., Houston Oil Company of Texas, Houston; vice president for refining, J. Howard Pew, Sun Oil Company, Philadelphia; vice president for marketing, Eric V. Weber, Eureka Oil Company, Cincinnati; executive vice president, W. R. Boyd, Jr.; treasurer, O. D. Donnell, The Ohio Oil Company, Findlay, Ohio; secretary and assistant treasurer, Lacey Walker; assistant secretary, J. S. Cooke.

Institute vice presidents, as chairmen of divisional general committees, have appointed chairmen and members of divisional nominating committees which will nominate 20 of the 25 members of the production and refining general committees to serve during 1941. Chairman of the Division of Production Nominating Committee is A. H. Riney, Phillips Petroleum Company, Bartlesville. Chairman of the Division of Refining Nominating Committee is H. W. Camp, Cities Service Oil Company, Bartlesville.

25-Year Club Banquet

Several thousand years of service in the American petroleum industry will be commemorated at the second annual meeting and banquet of the 25-Year Club, scheduled for Tuesday evening, November 12, during the Institute's annual meeting.

President Allan Jackson has appointed a reception committee of 22 members whose service in the industry totals 1086 years. The chairman is C. C. Stoll, Stoll Oil Refining Company, Louisville, Ky., who has had 59 years of service, and the vice chairman is J. Edgar Pew, Sun Oil Company, Philadelphia, who has had 54 years in the industry.

Because of the large membership of the club, now close to 300, it is expected that only members will be invited to attend the banquet.

Members are men who have been engaged in the petroleum industry for 25 years or longer, of which at least five years have been in marketing and/or refining branches.

AXTELL J. BYLES
President of the Institute

Speakers at General Sessions

American Petroleum Institute

Twenty-first Annual Session

ROBERT E. WILSON was born in Ohio in 1893, and after graduation at Wooster College had two years of advanced chemistry at M. I. T., where he was associate professor of chemistry after service in the World War. He joined Standard Oil Company (Indiana) in 1922 as assistant director of research and advanced to vice president. In 1935 he became vice chairman of Pan American Petroleum & Transport Company and president in 1937. In June, 1940, he accepted part-time employment as head of the Petroleum Section of the Council of National Defense.

T. H. BARTON, of Lion Oil Refining Company, El Dorado, Arkansas, is a pioneer in the Arkansas petroleum industry. He began operations in South Arkansas shortly after the discovery in 1921. He became associated with Lion Oil Refining Company as president in 1929. He was founder and first president of the Arkansas Livestock Show Association and is now chairman of the executive committee. He is publisher of "Arkansas Farmer," and is president and director of numerous companies, and director of various oil associations, including the Institute's board.

WILLIAM J. CAMERON has been with Ford Motor Company, Detroit, Michigan, since 1918, and for five years has been a speaker on the Ford Sunday Evening Hour. He was on the editorial staff of the Detroit News for 18 years, first as a reporter and then as editorial writer. Many of his editorials have been widely reprinted, and one, entitled "Don't Die on Third," written 27 years ago, is included in the American Book Company's school readers. He is Scotch, about 60 years of age, and is much in demand as a speaker.

HENNING W. PRENTIS, JR., is president of the National Association of Manufacturers and of Armstrong Cork Company. He is widely known for the advanced employment policies of his company and for his interest in the development of a better understanding of the mutual interests of business and education. He was chairman of the N. A. M. Committee on Industrial Practices which made a two-year study and prepared the manual "Constructive Industrial Practices," and a briefer "Code of Ethics for Industry."

MARTIN DIES of Orange, Texas, Member of Congress, was born at Colorado, Texas, November 5, 1901, graduated from Beaumont High School and attended Cluster Spring Academy and the University of Texas. After receiving L.L.B. at National University he was admitted to the bar at the age of 19. He engaged in practice of law at Marshall, Texas, for two years and then moved to Orange. Elected to the Seventy-Second Congress, he has been successively reelected up to and including the Seventy-Sixth Congress.

PROGRAM

General Sessions

WEDNESDAY, NOVEMBER 13, 1940

2:00 P. M. Grand Ball Room

Presentation of Accident-Prevention Certificate Awards. Report of Board of Councillors and Election of Directors.

President's Address:

Axtell J. Byles, American Petroleum Institute, New York, N. Y.

Address:

T. H. Barton, Lion Oil Refining Co., El Dorado, Ark.

Address:

Dr. Robert E. Wilson, in charge of Petroleum Section, Raw Materials Division, Advisory Commission to the Council of National Defense, Washington, D. C.

★

THURSDAY, NOVEMBER 14, 1940

2:00 P. M. Grand Ball Room

Address:

W. J. Cameron, Ford Motor Co., Detroit, Mich.

Address:

H. W. Prentis, Jr., National Association of Manufacturers, New York, N. Y.

Address:

Hon. Martin Dies, Member of Congress, Washington, D. C.

★

Transportation Automotive Group Session

TUESDAY, NOVEMBER 12, 1940

2:00 P. M. South Ball Room

Automotive Transportation:

(Sponsored by the Central Committee on Automotive Transportation).

Presiding: Leo Huff, The Pure Oil Co., Chicago, Ill.

Protection Against Static Electricity.

J. M. Pearson, Sun Oil Co., Philadelphia, Pa.

Preventing and Extinguishing Tank-Truck Fires.

J. F. Winchester, Standard Oil Co. of New Jersey, New York, N. Y.

Should Gross-Weight Limitations Be Universal?

J. W. Sinclair, Union Oil Co. of California, Los Angeles, Calif.

Safe Transportation in Oil Fields.

R. B. Roaper, Humble Oil and Refining Co., Houston, Texas.

Objectives of the club are purely social.

The annual banquet of the Institue of Petroleum will be held Wednesday evening, November 13, in connection with the A. P. I. meeting. The guest of honor and speaker will be Dr. T. A. Boyd, of General Motors Corporation.

Photographic Salon

Noveltv feature of the Institute's Twenty-First Annual Meeting is a "Petroleum Industry Photographic Salon," which opened November 9 in the Antique Lounge of the Stevens Hotel and is to continue throughout the meeting.

The salon consists of prints submitted in competition by photographers of the United States and Canada. It was sponsored jointly by the Institute and the Photographic Society of America as the first of a series of industrial salons to be conducted by the society in an effort to encourage pictorial presentation in photographic form of industrial life.

The basic subject of the salon is "The Petroleum Industry" and photographers were invited to submit prints on such subjects as production, refining, transportation, storage, marketing, utilization, and research. Some excellent artistic views of the industry are on display.

Attendance Grows

New attendance records constantly are being established at the Institute's mid-year and annual meetings. Twenty years ago the first annual meeting was attended by slightly more than 400. More than 3100 registered for the twentieth affair last year in Chicago. The records do not disclose attendance at the first mid-year meeting, which took the form of three separate divisional affairs, but registrations reached 541 at the second and 1412 at the tenth.

No data are available to show attendance meetings of committees, chapters, and districts of the Institute held each year, but a conservative estimate would indicate that in a 12-month period gatherings of oil men held under the sponsorship of the Institute have a total attendance of upward of 75,000.

Other evidence of the growth of the Institute may be found in its meetings. Ten years ago some 50 committees convened at the average annual meeting; in recent years more than 100 committee sessions were scheduled. Nearly as many

PROGRAM
(Continued)

Division of Production Group Sessions

WEDNESDAY, NOVEMBER 13, 1940

9:30 A. M. South Ball Room

Production Practice and Technology:

(Sponsored by the Central Committee on Drilling and Production Practice).

Presiding: M. Albertson, Shell Oil Co., Inc., Houston, Texas.

Oil Recovery by Air Drive in the Venango Fields of Pennsylvania.

P. A. Dickey, Pennsylvania Topographic and Geologic Survey, Harrisburg, Pa., and R. B. Bossler, Brundred Oil Corp., Oil City, Pa.

Factors Affecting Reservoir Performance.

R. D. Wyckoff, Gulf Research and Development Co., Pittsburgh, Pa.

The Determination of Factors Affecting Reservoir Performance.

M. Muskat, Gulf Research and Development Co., Pittsburgh, Pa.

Multiple Liquid Phases in Hydrocarbon Solutions.

W. N. Lacey, California Institute of Technology, Pasadena, Calif.

★

THURSDAY, NOVEMBER 14, 1940

9:30 A. M. West Ball Room

Pipe-Line Transportation Problems:

(Sponsored by the Topical Committee on Pipe-Line Technology of the Central Committee on Pipe-Line Transportation).

Presiding: J. C. Stirling, Stanolind Pipe Line Co., Tulsa, Okla.

API Pipe-Coating Tests — Final Report.

Kirk H. Logan, National Bureau of Standards, Washington, D. C.

Fluid-Meter Research at the University of Oklahoma.

W. H. Carson, Dean, College of Engineering, The University of Oklahoma, Norman, Okla.; and E. E. Ambrosius, Associate Professor of Mechanical Engineering, The University of Oklahoma, Norman, Okla.

Thirty-Minute Movie—"Construction of Salt Lake City Pipe Line of Stanolind Pipe Line Company."

J. C. Stirling, Stanolind Pipe Line Co., Tulsa, Okla.

PROGRAM
(Continued)

Division of Production Group Sessions—*Continued*

THURSDAY, NOVEMBER 14, 1940

9:30 A. M. South Ball Room

Drilling and Production Practice:

(Sponsored by the Central Committee on Drilling and Production Practice).

Presiding: C. E. Reistle, Jr., Humble Oil and Refining Co., Houston, Texas.

Hydraulics of Mud-Circulating Systems.

W. W. Moore, Tulsa, Okla.

Continuous Logging at Rotary-Drilling Wells.

J. T. Hayward, Barnsdall Research Corp., Tulsa, Okla.

Economics of Controlling Water Produced with Oil.

J. U. Teague, Hogg Oil Co., Houston, Texas.

Report of Division's Nominating Committee.

A. H. Riney, Phillips Petroleum Co., Bartlesville, Okla., Chairman.

Election of Twenty Members of the General Committee of the Division of Production.

★

Division of Refining Group Sessions

WEDNESDAY, NOVEMBER 13, 1940

9:30 A. M. Grand Ball Room

Miscellaneous Topics:

Presiding: G. W. Hanneken, The Standard Oil Co. (Ohio), Cleveland, Ohio.

Use of Lecithin in Gasoline.

H. V. Rees, W. S. Quimby, and J. C. D. Oosterhout, The Texas Co., New York, N. Y.

The Naphtha Polyform and Gas Reversion Processes.

J. E. Bogk, Phillips Petroleum Co., Bartlesville, Okla.; P. Ostergaard, Gulf Oil Corp., Pittsburgh, Pa.; and E. R. Smoley, The Lummus Co., New York, N. Y.

Synthetic Chemicals from Petroleum.

L. Rosenstein, Shell Chemical Co., San Francisco, Calif.

Use of Azeotropic Distillation in Separating Hydrocarbons from Petroleum.

Frederick D. Rossini, B. J. Mair, and A. R. Glasgow, Jr., National Bureau of Standards, Washington, D. C.

The Emulsion De-oiling Process.

A. H. Schutte, The Lummus Co., New York, N. Y.

convene at the mid-year affairs. A few years ago the number of speakers at the annual meetings was less than 20; in recent meetings the number of papers presented has approximated 50. At the Tenth Mid-Year Meeting, held this year in Fort Worth, 28 papers, representing the work of 45 technologists and others, comprised the program of group and general sessions.

A few years ago the annual meeting occupied two or three days; currently the annual meeting program covers five full days, and the mid-year meeting program four full days. Some committees convene several days in advance of the opening of the formal program. At both annual and mid-year meetings it has become necessary to hold evening sessions to complete the program.

Founded in 1919

The Institute was founded in 1919, some 60 years after the completion of the Drake well. The organization was an outgrowth of the National Petroleum War Service Committee, which, comprised of oil men, had functioned during the World War in helping the United States and the Allies to keep their armed forces adequately supplied with petroleum products.

The late Alfred Cotton Bedford, former chairman of the board of Standard Oil Company of New Jersey, was chairman of the organizing committee which met at Washington, D. C. Later Bedford familiarly was known as the "father" of the Institute.

The first honorary president was Thomas A. O'Donnell, of California, an old-time oil prospector. The first general secretary and counsel was R. L. Welch, who established headquarters in New York, where they still remain.

O'Donnell remained as president through 1924. His successors have been J. Edgar Pew, Sun Oil Company, during 1925; W. S. Farish, Humble Oil & Refining Company, during 1926; the late E. W. Clark, of California, during 1927 and 1928; E. B. Reeser, Barnsdall Oil Company, during 1929, 1930 and 1931. In 1932 the presidency was made an active position. It was filled by the late Amos L. Beaty, formerly of The Texas Company, during 1932; and by the late C. B. Ames, of The Texas Company, during the first six months of 1932. Since June 1, 1933, Axtell J. Byles, formerly of Tide Water Associated Oil Company, has served as president.

PROGRAM
(Continued)

Division of Refining Group Sessions—*Continued*

THURSDAY, NOVEMBER 14, 1940

9:30 A. M. Grand Ball Room

Lubrication:

Presiding: T. G. Delbridge, The Atlantic Refining Co., Philadelphia, Pa.

Classification of Motor Oils.

W. S. James, The Studebaker Corp., South Bend, Ind.

Heavy-Duty Motor Oils.

H. C. Mougey, General Motors Corp., Detroit, Mich.

Illustrated Field Observations of Paint Performances and Practices at Refineries.

H. H. James, E. I. duPont de Nemours & Co., Tulsa, Okla.

★

FRIDAY, NOVEMBER 15, 1940

10:00 A. M. Grand Ball Room

Fuels and Engines:

Presiding: G. G. Oberfell, Phillips Petroleum Co., Bartlesville, Okla.

Engine Performance as Influenced by Ignition-Timing Maintenance.

R. J. Greenshields and L. E. Hebl, Shell Oil Co., Inc., Wood River, Ill.

Fuel-Quality Requirements as Affected by Items of Motor Maintenance.

H. M. Trimble and K. C. Bottenberg, Phillips Petroleum Co., Bartlesville, Okla.

Trends in Automotive Design Match Evolution in Fuels.

T. A. Boyd and W. G. Lovell, General Motors Corp., Detroit, Mich.

Report of Division's Nominating Committee.

H. W. Camp, Cities Service Oil Co., Bartlesville, Okla., Chairman.

Election of Twenty Members of the General Committee of the Division of Refining.

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ANNUAL DINNER

Thursday, November 14, 1940

7:30 P.M. **Grand Ball Room**

A program of entertainment

Well Logging By Radioactivity

By DR. WILLIAM L. RUSSELL
Well Surveys, Inc., and Lane-Wells Company

THE oil industry has long felt the need for some device which would make accurate well logs through casing, and the development of radioactivity logs now makes this possible.

Electric logs have given fine results, and their accuracy in determining the depths of the oil sands is well-known. However, they are entirely limited to open holes. After the casing has been run and cemented, the only hope of obtaining an accurate well-log, if one has not been obtained previously, lies in radioactivity surveys. At present it is customary to make an electric log of the new wells, but as this is a comparatively recent development, there are many thousands of wells now cased of which no accurate log is available. These wells offer an extensive field for radioactivity surveys.

The Seminole region of Oklahoma affords an excellent example of the way in which radioactivity surveys can help oil operators. In this area the discovery of prolific gusher production in the Wilcox sand at a depth of around 4300 feet resulted in a highly competitive drilling race to reach the Wilcox. Generally no accurate log was kept of the shallower Pennsylvanian formations penetrated. Now that the Wilcox production is nearly exhausted, and oil production has been found in the Pennsylvanian sandstones, oil operators naturally are anxious to plug back their wells from the Ordovician and gun-perforate the casing opposite the Pennsylvanian oil sand. The trouble is that owing to the lack of reliable well logs, no one knows where the casing should be perforated. Even if the depths of the shallower producing sands were known accurately in a given well. the depth of the same sand in an adjoining location might differ by one or two hundred feet, owing to the crookedness of the holes. The advent of radioactivity surveys fortunately has removed these difficulties, and it is now possible, by logging through the casing, to determine the exact position of all the Pennsylvanian oil sands.

Radioactivity surveys have proven very useful in determining the amount of sample lag in wells drilled by rotaries, as is explained below.

The Nature of Radioactivity

A brief description of radioactivity should give a better understanding of how the process works. Radioactivity is the spontaneous change of the atoms of one element into those of another. The rate of this change is generally expressed as the "half-life," which is the time it takes for half of an element to change into another element. The half-life of the various radioactive elements varies all the way from a fraction of a second to several billion years. It is a fixed and unalterable property, and no artificial agencies, such as heat and pressure, are able to change it in the least.

During the course of their transformations, the radioactive elements give off three types of rays. The alpha rays consist of atoms of the rare gas, helium, which are expelled at velocities of several thousand miles per second. The beta rays are electrons, which are expelled at still higher velocities. The gama rays are produced when the beta rays strike any kind of matter. They are electromagnetic waves like light rays, but of much smaller wave length. While the wave length of visible light is about one fifty thousandth of an inch, the wave length of gamma rays is around one ten billionth of an inch. Gamma rays are also much like X-rays, but they are of shorter wave length and more penetrating. The gamma rays alone are used in making the radioactivity logs.

Most of the radioactive elements belong to three different series. Each series starts with a parent element, which changes into another element, that in turn changes into a third element, etc. The uranium series starts with uranium and contains as one of its intermediate products the well-known element, radium. The actinium series begins with actino-uranium, while the thorium series starts with thorium. Most of the gamma rays utilized in making radioactivity surveys are produced by members of these three series. Potassium is also radioactive, but it is thought that its gamma rays do not affect the radioactivity logs appreciately except in highly micaceous rocks and in evaporites, such as salt deposits. After about 100,000 years the elements of the various radioactive series are in equilibrium with each other, and then the proportion of any element of the series can be determined if the proportion of one member is known.

Distribution of Radioactive Matter in Rocks

It has been found by careful tests that all natural rocks contain some radioactive material, although it is generally present in enormously minute amounts. Of the igneous rocks, the light colored acidic types like granite contain most, while the heavy, basic, rocks contain least. The radioactive substances in the sedimentary rocks were derived originally from the igneous, but this radioactive matter was distributed very unequally among the different types of sedimentary rocks. The pure limestones and sandstones received least, the shaly limestones and shaly sandstones a little more, and the shales most. However, the different types of shales vary greatly. The marine organic shales are more radioactive than any other type of sediment.

Coals, on the other hand, are very weakly radioactive.

At the surface, the effect of the cosmic rays on the surveying instrument is about the same as the effect of the gamma rays from the rocks. Fortunately, the cosmic rays do not penetrate far below the surface, and below a depth of twenty-five or fifty feet their effect is negligible.

Description of Apparatus

The present instrument used in radioactivity well surveying consists of a metal cylinder about 8½ feet long and 4⅝ inches in diameter. A 3⅝-inch diameter instrument will be available soon. The lower part contains a mixture of gases under pressure and is known as the ionization chamber. The gamma rays from the formations traversed ionize the gas in the ionization chamber, and decrease its resistance to the passage of an electric current. The conductivity of the gas in the ionization chamber is proportional to the intensity of the gamma rays, and thus the amount of current which can pass through the ionization chamber indicates the relative amounts of radioactive material in the geologic formations traversed. The current is produced entirely by batteries in the instrument, and is not generated by the radioactive substance.

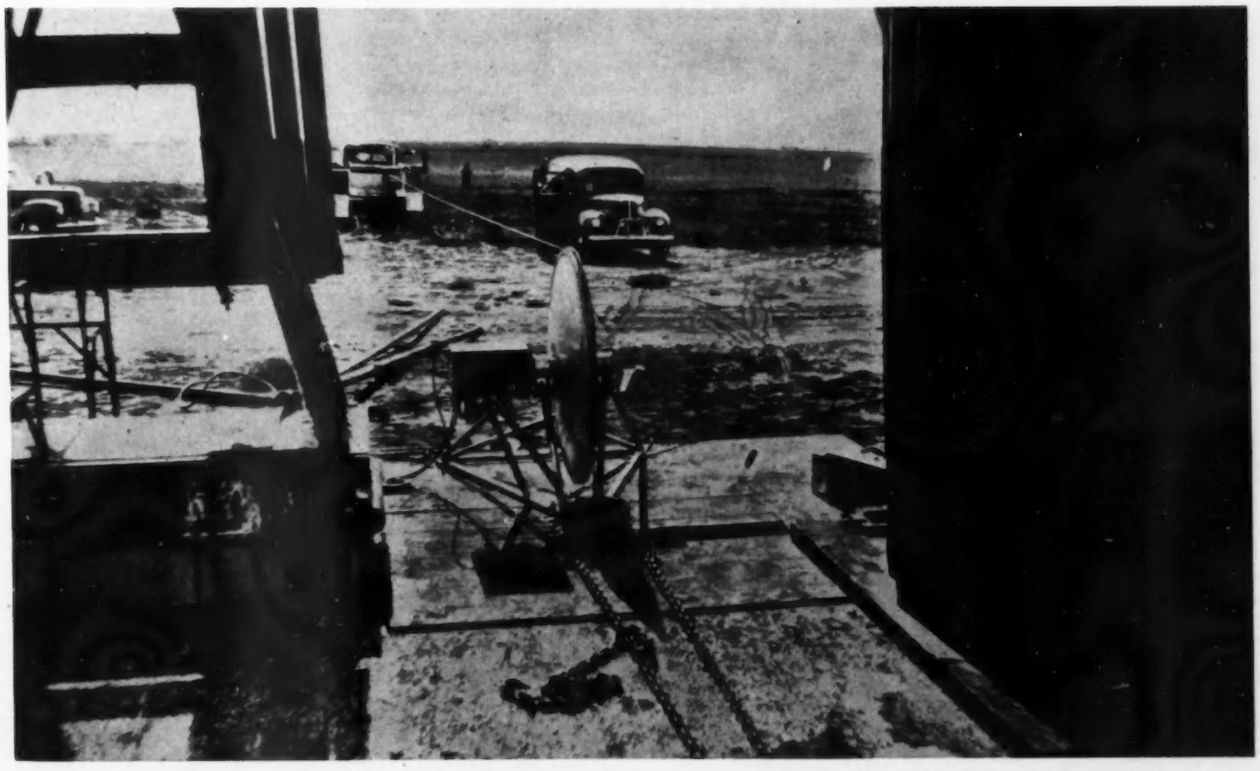
The variations in the amount of current passing through the ionization chamber amount to only one ten trillionth $\frac{1}{10,000,000,000,000}$ amperes. This current is amplified enormously in the instrument, and is sent up to the surface through a coaxial cable. A coaxial cable contains a conductor of electricity on the outside and inside, with insulating material in between. The same coaxial cable is also used to lower and raise the instrument in the well. As the cable reaches the surface it passes over a measuring wheel, which is connected to a Selsyn motor that registers the exact depth at the well, in the winch truck and in the instrument truck. The current passing through the cable is conducted from the winch or hoist truck to the instrument truck, where it is further amplified and operates an automatic pen recorder which draws a log in the field as the survey is in progress. It is a great advantage to be able to see the log immediately, in order to be sure that everything is working in a satisfactory manner at all times. Greater accuracy is obtained by logging in coming out of the well. The normal speed of surveying is 1500 or 2000 feet per hour.

An apparatus and technique also have been developed for testing the radioactivity of cores and samples, about a quarter of a pound being necessary. By these tests, it is possible to determine in advance of a well survey the type of radioactivity log which would be obtained.

Effect of Materials in the Hole

One of the advantages of gamma ray logs is that the materials likely to be found in oil wells have no unfavorable affect on the logs. The gamma ray log is just as satisfactory whether the well contains air, natural gas, water or mud. The logs can be made in open holes or in cased wells with equal accuracy, and satisfactory well surveys can be made readily through three strings of casing and the intervening cement. Of course, the cement and casing cut out some of the gamma rays, but this effect can be neutralized by increasing the amplification. The best practice involves keeping the same scale throughout the logging of each well.

If the cement is very thick and weakly radioactive, the log shows a shift to the left on entering the cement, followed by a more grad-



In the foreground is the measuring wheel to which is connected a Selsyn transmitter that registers the exact depth of the gamma ray detector in the hole in both the winch truck and the instrument truck, shown in the background.

ual shift to the right at the top of the cement. In such cases, the position of the cement behind the pipe can be estimated from the log. However, in the majority of the logs, the effect of the cement is so slight that its position cannot be determined. If the cement has about the same degree of radioactivity as the formations being logged, its effect is merely to decrease the size of the apparent variations in radioactivity, which means that the curves or projections to the left and right on the logs are smaller.

Preparing a Well for Gamma Ray Logging

All that is necessary to prepare a well for radioactivity logging is to remove the rods and tubing, and check the casing record to be sure that the hole is large enough for the instrument to enter it. If the hole is clogged with deposits of paraffin or salt, it may be necessary to clean them out with some heavy tool before making the survey. Some suspending medium is needed for lowering the surveying instrument into the well. If there is no derrick or mast at the well, the instrument can be suspended from a gin pole on a truck backed up to the well.

The position of the cement behind the casing has a very important bearing on the successful gun perforation of the casing opposite any oil sands found by gamma ray logging. If the casing is gun perforated above the top of the cement, water from sands higher up the hole will generally run down behind the casing and drown out any oil produced from the oil sand. It is therefore advisable to protect the oil sand by covering it with cement squeezed through the casing, in the cases where it is not already protected.

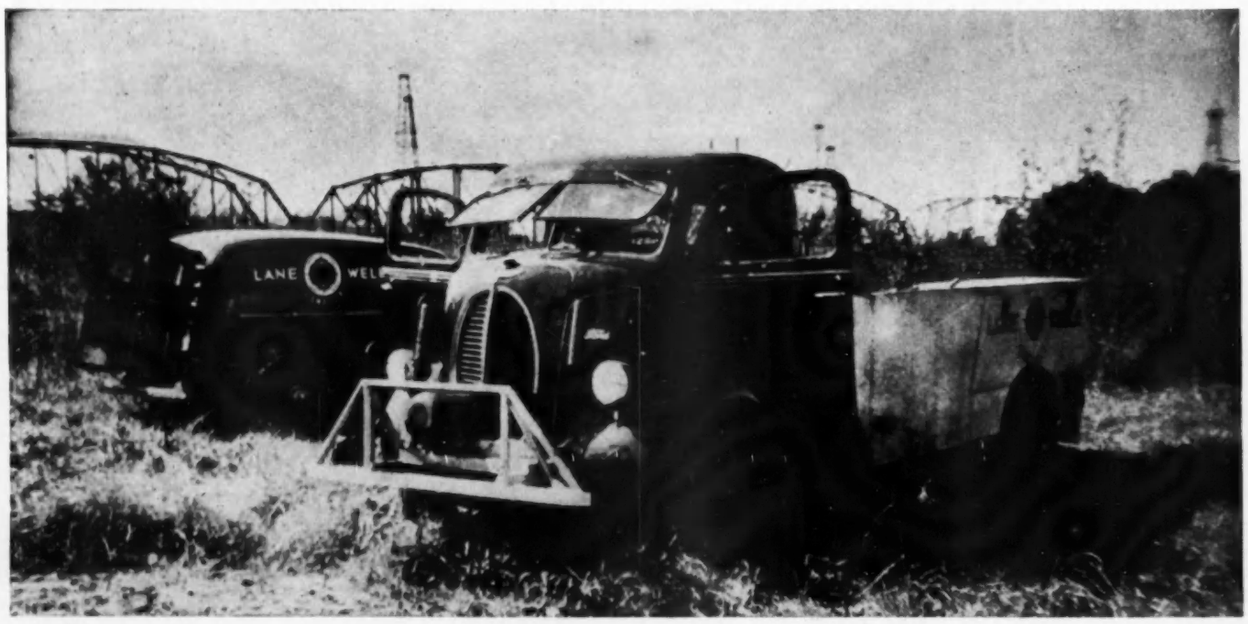
Interpretation of Gamma Ray Logs

Since the intensity of the radioactivity increases toward the right on the radioactivity logs, the weakly radioactive sandstones and limes show up as projections to the left, while the black marine shales make prominent peaks to the right. Because the limestones and sandstones show up in the same manner, it is necessary to have a sample log of some well in the vicinity of the survey in order to distinguish between them. Of course, in many cases a geologist familiar with the area can recognize the various formations at a glance. At present it is not possible to determine from the logs the nature of the fluid contents of the various reservoir rocks. However, the logs show accurately the tops of the various sands, and from their structural position with reference to other tests of the same sands it is often possible to predict before perforating whether they will contain oil, gas or water.

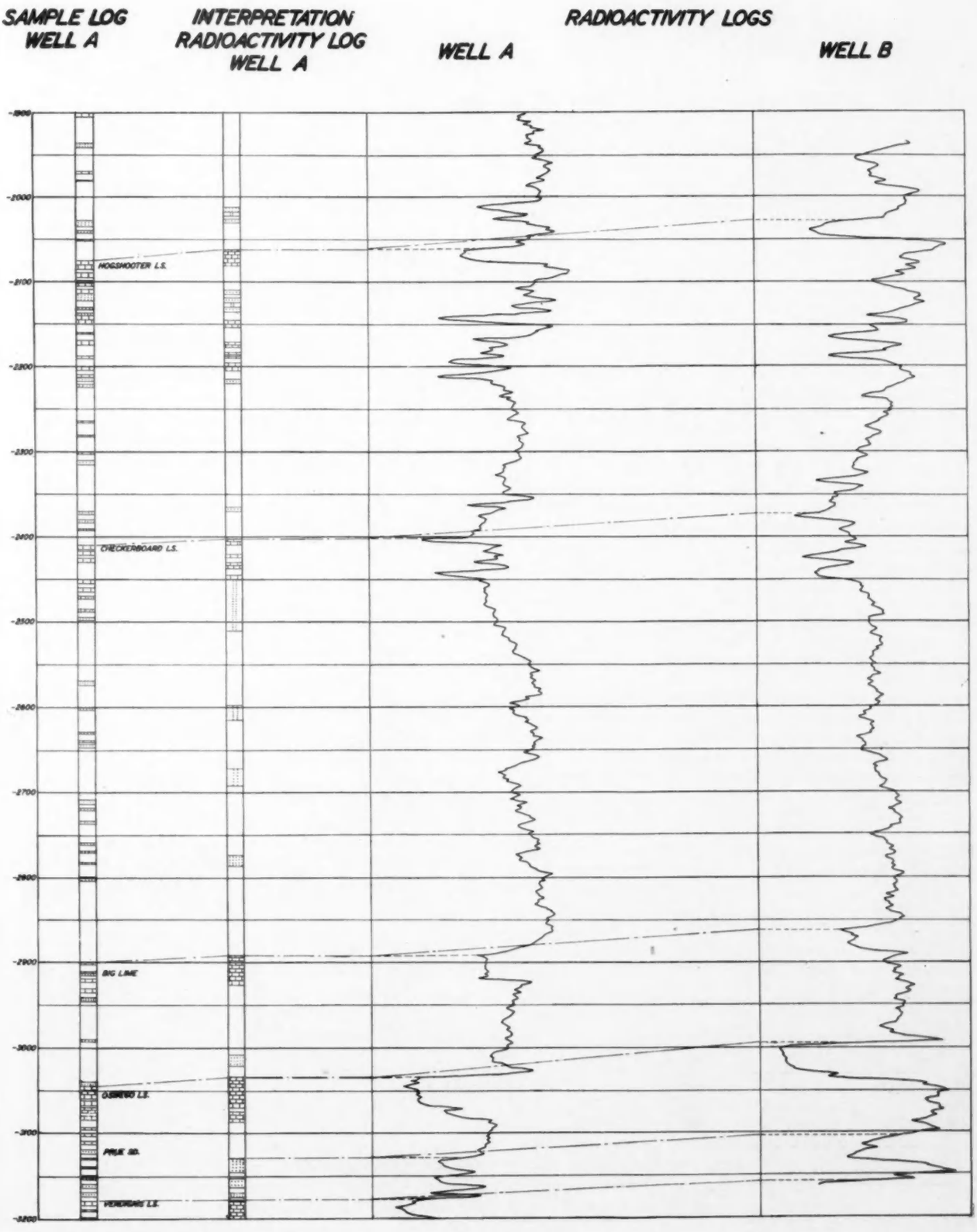
Fortunately the various geologic formations tend to make characteristic patterns on the radioactivity logs. These characteristic shapes of the various formations are in general about as persistent as the lithologic units they represent. Some formations, such as the Chattanooga shale, show up in much the same manner for distances of 500 miles or more. The appearance of the Viola, Sylvan, Hunton, and Woodford formations in central and east-central Oklahoma is so similar on the various radioactivity logs that they can be recognized generally at a glance, even if the location of the well is unknown. On the other hand, where the lithologic units themselves are non-persistent, as in the Permian red beds and some Pennsylvanian limes and sands of central Oklahoma, it may not be possible to correlate the formations even over short distances, though, of course, the marine lower Pennsylvanian strata in the same area may be readily correlated. It is fortunate that the marine organic shales show up so conspicuously on the logs, for in some areas these thin black shales are very persistent and are the best beds in the section for correlation purposes.

Estimating Porosity From Radioactivity Logs

The curves and patterns shown on the gamma ray logs are not directly related to porosity or permeability. However, in some cases the porosity may be estimated from the gama ray logs. This is possible where the formations consist of shales and uncemented sandstones. Here the porosity of the sandstones is determined chiefly by



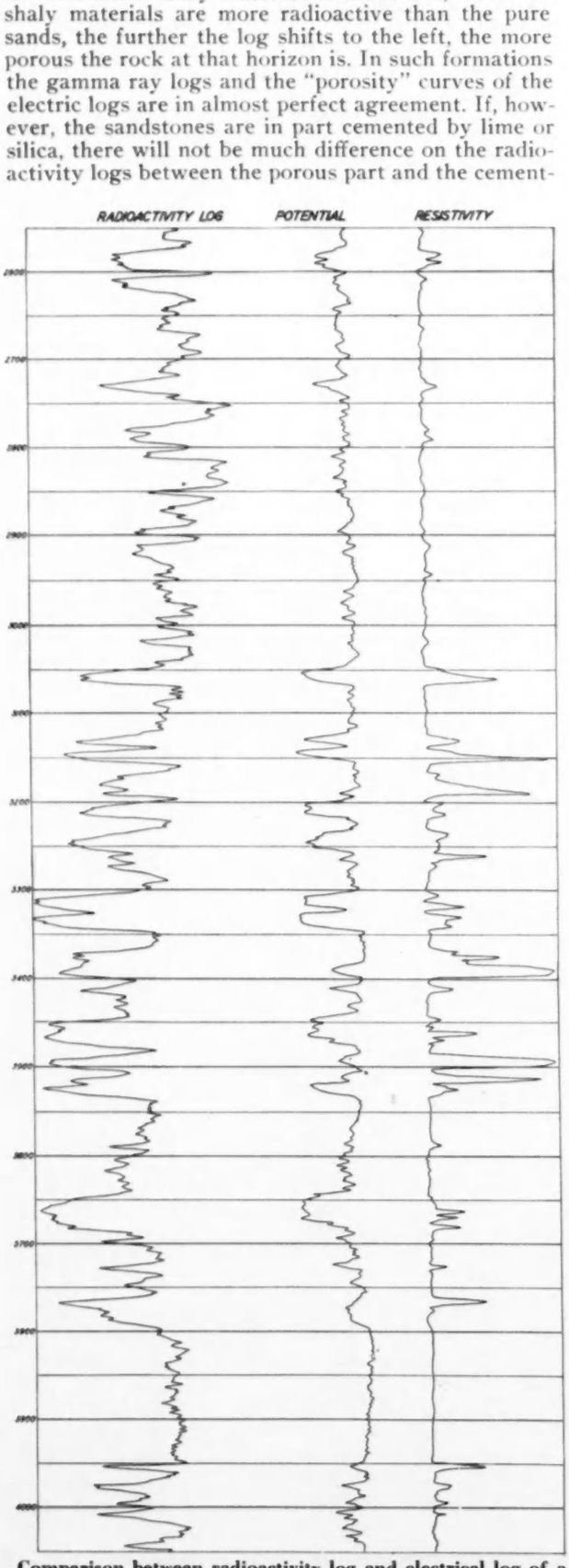
In the foreground is the winch truck, which is equipped with a large cable drum. In the background is the instrument truck, inside of which are the recorders and other dials.



From the above illustration note:

1. **Well "A" and well "B" are ¾ mile apart, in the same field.**
2. **The lag between the tops of the individual formation members in sample log of well "A" as compared to the actual tops as indicated by the interpretation on the radioactivity log of well "A."**
3. **The correlatibility of sample log and interpretation of radioactivity log of well "A."**
4. **The correlatibility between the two radioactivity logs of well "A" and well "B."**

the amount of shaly material in them, and, since the shaly materials are more radioactive than the pure sands, the further the log shifts to the left, the more porous the rock at that horizon is. In such formations the gamma ray logs and the "porosity" curves of the electric logs are in almost perfect agreement. If, however, the sandstones are in part cemented by lime or silica, there will not be much difference on the radioactivity logs between the porous part and the cemented portion. In other words, while the "porosity" curves of the electric log would show only the porous portions of the sandstone, the gamma ray log would show the whole of the sandstone. The gamma ray logs will, however, log minor shale breaks, only a foot or two in thickness, in the sandstones. These show up as small, sharp peaks to the right on the larger leftward projections, due to the main body of the sandstone.



Comparison between radioactivity log and electrical log of a well in the Oklahoma City field.

The estimation of porosity of limestone from the radioactivity logs is more difficult than is the case with sandstones. It is not possible to determine from the gamma ray logs alone which portions of the limestones are porous. However, if the porous portions of a given limestone formation have been determined in a field, either by porosity tests or by noting which portions of them yielded fluids when penetrated, it may be possible, by making gamma ray logs of these wells, to determine how the variations in porosity in that formation affect the radioactivity log. Once this relation has been determined, it may hold for all the wells in the the field for the particular producing horizon. Even if the variations in radioactivity that are associated with porosity are very minute, they may be logged accurately by lengthening the time constant of the instrument and surveying very slowly. Unless the porosity relations for a given field have been previously determined in this manner, it is not safe to attempt to estimate the porosity of limestones from the gamma ray logs.

Statistical Variations

The intensity of the gamma rays affecting the surveying instrument at a given depth in a well is not constant, but fluctuates slightly, owing to the variations in the number of atoms that chance to disintegrate in a given amount. This situation may be understood by imagining a cloud of fireflies flashing at irregular intervals on a summer night. The number of flashes in a second would vary greatly owing to chance, but the percentage of difference in the number of flashes in an hour, due to the chance variations, would be much smaller. In the same way, these chance variations in radioactivity, known as statistical errors, would have a large effect on the gamma ray logs if the survey were extremely rapid. At the normal speeds of surveying these statistical errors are not large enough to interfere with the interpretation of the logs of ordinary formations because the ionization chamber is opposite a given stratum long enough for them to average out. Their sole affect is to make minor wrinkles on the log, which are not duplicated on repeating the survey. However, in case it was necessary to survey with great accuracy some weakly radioactive rock, such as a pure limestone, these statistical errors would affect the interpretation of the log, if normal speeds were used. In such cases it is possible by lengthening the time constant of the instrument and surveying more slowly to obtain any degree of accuracy of magnification desired, and still keep the statistical errors down to negligible proportions.

Accuracy of Measurements

It is generally possible to determine the depth of the various contacts which show up on the logs to within about two feet. If the log shows a nearly horizontal shift across the paper, the true depth of the contact is at the mid-point of the shift, and not at its beginning or end.

The question is often asked whether it is possible to find the bottom of the hole by inspecting the gamma ray logs. This may be determined much more accurately by the weight indicator attached to the cable than by the log. If it were not for the statistical variations, the log would show a straight vertical line if a log was made while the instrument is resting on the bottom of the hole. However, these statistical errors cause the line to be slightly wavy, and this might be mistaken for a uniformly radioactive rock.

Uses of Gamma Ray Logs

For Gun Perforating: The most obvious use of radioactivity logs is for determining where to gun perforate the casing, and most of the work so far has been for this purpose. In the case of many of the wells surveyed, there was no previous log available, or merely a driller's log which was so inaccurate as to be entirely worthless. In such cases it is necessary to correlate the gamma ray log with the sample log of some well in the vicinity, in order to identify the formations and to distinguish between the sandstones and limestones. Generally, the various geologic units stand out so clearly on the gamma ray logs that a geologist thoroughly familiar with the stratigraphy of the area can identify the formations immediately. In deciding which sands to gun perforate, it is, of course, advisable to take into account the available information on the structural position of each sand with reference to previous tests or showings in the same field.

The results of gun perforating in general have been highly successful. In a number of cases a production of 200 to 300 barrels per day has been found, which is very profitable, since the wells are already drilled. It should, of course, not be supposed that oil is invariably found, for in some wells the results of testing are gas, salt water, or mud. It should be remembered that if the oil sand is not protected by cement, mud, or salt water are likely to be found on gun perforating even if the perforations are made opposite the sand and the sand is capable of producing oil.

Determining the Sample Lag: One of the most useful aspects of radioactivity logs is their ability to measure accurately the amount of sample lag. The methods commonly used to make sample logs consist in sifting the samples out of the mud fluid used in drilling and plotting the character of the samples thus obtained against the depth at which the well was drilling when they reached the surface. Since it takes a considerable time for the samples to reach the surface after they have been cut by the bit, the depths shown on the sample logs are greater than the true depths by the distance the well drilled during this interval. This distance is called the sample lag. At present it is customary to correlate the speed of drilling with the sample log, and where this can be done accurately sample lag is eliminated. However, this is a recent development, and for a vast number of older wells the amount of sample lag is unknown, and there is no way of determining it accurately except by gamma ray logs.

When a good sample log is plotted along-side a gamma ray log, the amount of sample lag is apparent immediately. Generally it amounts to from ten to fifty feet. In many cases it is possible to draw nearly parallel lines slanting down from the formations on the gamma ray log to the same horizons of the sample log.

It is evident that the gamma ray and sample logs together are much more useful than either alone. The gamma ray logs show accurately the various formations and the details of the shale breaks, while the sample logs give the lithologic interpretation of the patterns shown on the gamma ray logs, and in some cases indicate the nature of the fluid contents of the reservoir rocks penetrated. It is of interest to note that radioactivity logs show that if the operators had gun perforated the casing at the depths where the best available data, including sample logs, indicated the oil sands were present, they would in some cases have missed the sands entirely.

Gamma ray logs are useful especialy in the rather numerous cases where oil occurs only in the uppermost portions of the oil sand, with salt water below. In such cases, gun perforating without accurate logs would result in expensive squeeze jobs, due to encountering salt water in the lower parts of the sand, but by the use of gamma ray logs the operators are enabled to hit the exact top of the oil sand in every case.

Other Uses of Gamma Ray Logs: Although so far most of the gamma ray surveys have been made to determine where to gun perforate, this is by no means the only use of process. Radioactivity logs may be used also to map subsurface structure for deeper drilling. In case accurate rotary or cable tool logs are not available in an oil field, it may not be possible to determine the top of the structure for a deep test. By making gamma ray logs through the casing, it is possible to select the exact top of the structure. Other possible uses of radioactivity logs are in obtaining good correlations, making structure sections, and in determining the exact depths at which faults intersect the wells.

One important use of gamma ray logs is in making correlatable logs of apparently uniform formations. There are many thick limestone or shale formations in which electric logs give rather featureless curves that are not suitable for correlation. It has been found that gamma ray logs of these formations commonly show variations in radioactivity which can be used for correlations between wells. In the case of relatively pure limestones of low radioactivity, these variations are sometimes so small that they cannot be logged accurately at the normal speeds of surveying. However, by lengthening the time constant of the instrument and surveying slowly, the effect of the statistical variations in radioactivity can be eliminated, and accurately magnified gamma ray logs obtained for correlation. In the case of the thick, apparently uniform shales, these variations in radioactivity can be logged at the normal speeds, and it has been found that these changes in radioactivity in many cases persist for considerable distances. A good example of this is the Chattanooga or Woodford formation. The gamma ray logs of this formation show that where it is thick it contains a number of peaks and lows of radioactivity, which can be accurately correlated over large areas. This proves definitely that highly correlatable gamma ray logs may be made of some, at least, of these seemingly uniform formations. Geologists may not be much interested in correlating the small subdivisions of the Chattanooga shale, but there are many other thick and seemingly uniform formations in which an exact correlation of the stratigraphic details would be of great economic importance.

Mexico and Indies Big Source of U. S. Import Increase

Venezuela, supposedly the chief beneficiary of the reciprocal trade agreement which reduced by 50 percent the excise taxes on crude petroleum and certain products on imports up to 5 percent of the amount refined in this country, has benefited relatively less than Mexico and the Netherlands, it is shown by analysis of the import figures thus far available for 1940.

While Venezuela, up to the end of September, had sent in only 24,876,471 barrels, or 56 percent of its quota of 44,500,348 barrels for the current year, Commerce Department and Tariff Commission figures show, the Netherlands had sent in 11,217,129 barrels, or 89 percent of its quota of 12,564,076 barrels, and Mexico 2,351,896 barrels, or 100 percent of its quota, in addition to 8,228,649 barrels on which full excise tax rates were paid. Colombia, the other participant in the quotas, had sent in only 366,041 barrels, or 15 percent of its allotment of 2,475,680 barrels.

Compared with 1939, imports during the first 10 months of this year were 82 percent higher, averaging 179,000 barrels a day as compared with 98,267 barrels, Tariff Commission records indicate. At the same time the domestic demand for all petroleum products increased only about 9 percent, thus supporting the charge of the industry that imports have taken a much larger share of the market than they enjoyed before the trade agreement was entered into.

To give a fair picture of the situation, the figures include only those imports which are subject to the excise tax and do not include imports admitted free for supplies of vessels or for manufacture in bond and re-export. These "duty-free" imports have decreased as compared with 1939 due to the decrease in world shipping and the loss of foreign markets resulting from the war.

The following tabulation compares the monthly imports during the first 10 months of this year with those for the corresponding periods in 1939, and in Table 1 are shown in detail imports by months for 1939 and up to September of this year, giving separately taxable imports, imports for supplies of vessels and imports in bond for manufacture and re-export:

	Imports of Petroleum and Its Products for Consumption within the U. S. and Subject to the Excise Taxes		Percent Increase 1940 over 1939
	1939 (bbls. daily)	1940 (bbls. daily	(percent)
Jan.	64,094	113,698	77
Feb.	68,062	174,696	157
Mar.	70,060	199,784	185
April	95,323	176,658	85
May	135,276	168,000	24
June	140,165	174,727	25
July	103,643	188,513	82
Aug.	101,476	195,643	93
Sept.	109,897	190,852	74
Oct.	93,379	205,000 (Est.)	120
Average 10 months	98,267	179,000	82

(All figures from data from U. S. Tariff Commission except estimate for October, 1940, which is computed from weekly trade statistics.)

State Department officials have little to say about the situation, other than to contend that to get a "true picture" the whole import-export trade between the United States and Venezuela must be considered. But the Independent Petroleum Association, which is attempting in Congress and before the Committee for Reciprocity Information to secure a revision of the agreement, is unsparing of its criticism of the treaty, pointing out that Mexico, allowed a quota of less than 2,500,000 barrels, shipped into this country in the first 9 months of this year more than 10,500,000 barrels and declaring that "the wide differences between countries and the large shipments from Mexico in excess of the quota and at the higher tax rate emphasize what has often been contended—that the removal of these taxes from the control of Congress was more important than the reduction of the tax itself."

The "over-all" picture which the State Department contended would prove the value of the excise-tax concession as a spur to United States trade with Venezuela shows in disappointing rather than encouraging colors.

Department of Commerce statistics show that during the first 8 months of the treaty's application

TABLE 1
Imports of Petroleum and Its Products
1939 and 9 Months 1940
(All Figures in Barrels)

	Imports for Domestic Consumption—Taxable		Imports for Supplies of Vessels—Free		Import for Manufacture in Bond and Export—Free		Grand Total All Imports	
	Total	Daily Average	Total	Daily Average	Total	Daily Average	Total	Daily Average
1939—Jan.	1,986,918	64,094	1,257,977	40,580	677,859	21,866	3,922,754	126,540
Feb.	1,905,733	68,062	1,287,842	45,994	705,535	25,198	3,899,110	139,254
Mar.	2,171,848	70,060	1,143,105	36,874	552,253	17,815	3,867,206	124,749
Apr.	2,859,705	95,323	1,744,639	58,155	552,997	18,433	5,157,341	171,911
May	4,193,561	135,276	1,253,509	40,436	874,249	28,202	6,321,319	203,914
June	4,204,960	140,165	1,500,381	50,013	827,668	27,589	6,533,009	217,767
July	3,212,923	103,643	1,347,291	43,461	1,135,825	36,639	5,696,039	183,743
Aug.	3,145,763	101,476	2,107,681	67,990	970,980	31,322	6,224,424	200,788
Sept.	3,296,899	109,879	957,339	31,911	1,117,161	37,239	5,371,399	179,047
Oct.	2,894,754	93,379	1,228,807	39,639	910,295	29,364	5,033,856	162,382
Nov.	3,186,580	106,219	759,282	25,310	533,305	17,777	4,479,167	149,306
Dec.	3,890,376	125,496	919,875	29,673	296,159	9,554	5,106,410	164,723
Year	36,950,020	101,233	15,507,728	42,487	9,154,286	25,080	61,612,034	168,800
1940—Jan.	3,524,623	113,698	868,522	28,017	239,915	7,739	4,633,060	149,454
Feb.	5,066,178	174,696	1,045,031	36,036	161,220	5,559	6,272,429	216,291
Mar.	6,193,297	199,784	882,546	28,469	656,223	21,168	7,732,066	249,421
Apr.	5,299,742	176,658	1,199,695	39,990	301,888	10,063	6,801,325	226,711
May	5,207,986	168,000	911,723	29,410	410,874	13,254	6,530,583	210,664
June	5,241,807	174,727	576,188	19,206	665,032	22,168	6,483,027	216,101
July	5,843,916	188,513	604,875	19,512	212,028	6,840	6,660,819	214,865
Aug.	6,064,937	195,643	1,692,431	54,595	229,555	7,405	7,986,923	257,643
Sept.	5,725,563	190,852	848,077	28,269	193,870	6,463	6,767,510	225,584
9 Months	48,168,049	175,796	8,629,088	31,493	3,070,605	11.206	59,867,742	218,495

Prepared by the Independent Petroleum Association of America from data of United States Tariff Commission.

exports to Venezuela increased only 9.8 percent over the preceding 8 months, while exports to all other South American countries increased 33.9 percent. On the other hand, imports from Venezuela increased 38.2 percent in that period, while imports from all other Latin American nations increased only 14.1 percent.

In Table 2 the total taxable imports from Venezuela, Netherlands West Indies and Mexico are compared for the first 9 months of 1939 and 1940, showing that the largest percentage increase (1157) has occurred in imports from Mexico, which jumped from a daily average of 3158 barrels last year to 39,701 barrels in 1940. Equally significant, however, the September figures show a daily average of 60,085 barrels. Substantial increases also are shown in taxable imports from Venezuela and the Netherlands West Indies, but the increase of 32 percent for the former and 96.7 percent for the latter is but a fraction of the extent to which Mexico has availed herself of the new set-up.

Table 3 is a break-down showing the products which have been most important to the several countries participating in the quota, which discloses that the large increase in crude imports has been due mainly to increased Mexican shipments, which advanced 890 percent, while the great increase in light fuels were from Venezuela, Netherlands West Indies and Mexico, as was the heavy increase in receipts of heavy fuel oils. Imports of topped crude oil were almost entirely from Netherlands West Indies and showed an expansion of only 5.5 percent.

Views expressed informally by some officials in the Administration indicate that the Venezuelan trade agreement has not worked out exactly as it was contemplated. All calculations as to the effect of the agreement have been upset by the importation of large volumes of Mexican oil at full excise-tax rates.

In the application of the agreement, it was expected that Venezuela, to which more than two thirds of the total quota was assigned, would take full advantage of her allotment, while the Mexican quota of little more than 3 percent was seen as expressing the dissatisfaction of the Administration over the Mexican government's oil policy. It was not foreseen that Mexico would be able to ship in five or six times as much oil as was assigned in the quota, paying full excise taxes on the bulk of it.

On the basis of the figures for the first nine months, it was evident that total imports this year under the reduced excise taxes would not fill the quota. Aside from Mexico, only the Netherlands West Indies took full advantage of the tax reduction; there is little indication that either Venezuela or Colombia will ship in the full amounts allocated them. At the close of September those two countries still had approximately 22,000,000 barrels still remaining.

TABLE 2

Imports of Petroleum and Its Products for Consumption Within the U. S. and Subject to the Excise Taxes
Venezuela, Netherland W. Indies and Mexico
1939 and 1940

IMPORTS FROM:	Taxable Imports for Domestic Consumption		Increase 1940 over 1939	
	1939 (Bbls. Daily)	1940 (Bbls. Daily)	(Bbls. Daily)	Percent
Venezuela:—Jan.	45,659	49,775	4,116	9.0
Feb.	47,958	90,098	42,140	87.9
Mar.	45,723	85,656	39,933	87.3
Apr.	80,017	92,632	12,615	15.8
May	84,758	104,273	19,515	23.0
June	96,742	106,763	10,021	10.4
July	72,279	88,388	16,109	22.3
Aug.	69,729	105,666	35,937	51.5
Sept.	82,219	103,310	21,091	25.7
Average 9 Months	69,504	91,754	22,250	32.0
Neth. W. Indies—Jan.	15,158	50,169	35,011	231.0
Feb.	21,402	62,016	40,614	189.8
Mar.	23,986	68,930	44,944	187.4
Apr.	14,971	46,413	31,442	210.0
May	19,875	23,734	3,859	19.4
June	30,495	34,658	4,163	13.7
July	21,691	36,410	14,719	67.9
Aug.	24,030	31,465	7,435	30.9
Sept.	20,333	24,196	3,863	19.0
Average 9 Months	21,319	41,929	20,610	96.7
Mexico—Jan.	.....	13,057	13,057	....
Feb.	.....	22,102	22,102	....
Mar.	6	38,694	38,688	....
Apr.	.....	34,120	34,120	....
May	2,279	39,279	37,000	1623.5
June	2,334	33,103	30,769	1318.3
July	9,281	59,285	50,004	538.8
Aug.	7,349	56,716	49,367	671.8
Sept.	6,859	60,085	53,226	776.0
Average 9 Months	3,158	39,701	36,543	1157.2

Prepared by the Independent Petroleum Association of America from data of United States Bureau of Foreign and Domestic Commerce and United States Tariff Commission.

TABLE 3

Imports of Crude Petroleum and Specified Products for Consumption Within the U. S. and Subject to Excise Taxes
First 9 Months 1939 and 1940

	Taxable Imports for Domestic Consumption		Percent Increase 1940 Over 1939
	9 Mos. 1939 (Barrels)	9 Mos. 1940 (Barrels)	
Crude Petroleum:			
Venezuela	18,930,063	20,271,364	7.1
Mexico	861,254	8,523,077	889.6
Other	1,167,976	293,686	—74.9
Total	20,959,293	29,088,127	38.8
Gas Oil & Distillate:			
Venezuela	44,651	274,596	515.0
Netherland West Indies	140,917	427,670	203.5
Mexico	.....	1,501,318	....
Other	251	.....	—100.0
Total	185,819	2,203,584	1085.9
Residual Fuel Oil:			
Venezuela	.....	4,559,936	....
Netherland West Indies	1,379,971	6,386,190	362.8
Mexico	457	556,150	....
Other	42,754	87,134	103.8
Total	1,423,182	11,589,410	714.3
Topped Crude Oil:*			
Netherland West Indies	4,269,344	4,508,094	5.6
Other	5,078	.....	—100.0
Total	4,274,422	4,508,094	5.5

* Includes some unfinished oil in 1939.
Prepared by the Independent Petroleum Association of America from data of United States Bureau of Foreign and Domestic Commerce and United States Tariff Commission.

Latest Thoughts On Origin of Oil

By W. A. REITER, Fohs Oil Company

PETROLEUM, being a liquid, has not been considered until recently to contain evidence as to its origin. Evidence was lacking until McConnell Sanders published his epochal work on this subject in 1937, and although it will require many years of research to determine the specific value of his discovery, it is already obvious that his technique and principle are of great import. All other sediments contain direct evidence as to their source. The study of coal and other sediments by the geologist, the chemist, and the biologist have determined the origin of these sediments; the evidence is trapped with the sediments. But petroleum, being a fluid, carries little evidence as to its origin, and because of its fluidity there is much doubt regarding its source bed, since it can pass from one formation to another, through fault breccia zones, or through crevicing or fracture zones. To arrive at any conclusion on this subject, we must study the latest thought by the best authorities; the geologist, chemist, biologist, physicist, and scientists who have made highly specialized studies of sediments. All have contributed their part in attempting to unravel the problem of the genesis of petroleum.

Much has been written on the question "Is petroleum formed organically or inorganically?" The chemists have generally considered, and have attempted to prove, inorganic origin, and recently some of the geophysicists have attempted to revive the inorganic theory, but it is now universally accepted by geologists that most of our petroleum originated organically. The following are some of the accepted theories and some of the facts concerning the problem.

Petroleum is derived from the remains of plant or animal life which are deposited with the sediments and which sometime thereafter are converted into petroleum by a process, the nature of which is not clear, although there is considerable evidence to support several different theories. It is becoming evident that the temperatures involved in the formation of oil are much lower than formerly assumed. The highest temperatures encountered in any producing well to date are about 300 degrees Fahrenheit, and it must be presumed that this oil was formed at definitely lower temperature than 300 degrees because the oil found at the above temperatures and depths is found in regional synclinoria that have been sinking for a long period of geological time.

Trask has spent much time and study and is convinced that petroleum does not form at the time the sediments are deposited. It also has been fairly well proven that some structures are barren because the uplifting occurred after migration. We have the great example of the Kelsey Dome in Upshur County, which is within sight of the great East Texas oilfield. Kelsey Dome is large enough to trap oil, and it cannot be said that there was a difference in sedimentation simply because of the proximity of the two areas. Trask found that the organic content in the Upper Cretaceous of East Texas was constant within a 200 mile radius, and undoubtedly the East Texas field contains oil that migrated from the very area where Kelsey Dome now exists. I understand that Dr. Gustave Egloff, the well-known chemist, recently stated in Chicago and repeated at Tulsa, that oil is forming in present structures. If that be true then Kelsey Dome should contain oil. Of course, the structure may have Cotton Valley or Smackover oil, but this would not invalidate the above statement.

THIS review of the research into the origin of petroleum was originally presented before the Houston Geological Society. The list of authors and titles of the several papers used by the writer are found at the end of the article.

Several notable authorities believe that the chief substances from which petroleum is formed are organic compounds that accumulate in nearshore deposits in an environment deficient in oxygen. We cannot be sure that the source material is all of marine origin but most of the evidence points in that direction. However, there is some evidence that part of the source material may have a continental source and we can be sure that the source material of which petroleum consists is a very special type of organic matter.

The vast non-metamorphosed sedimentary areas that are barren of oil must be considered, and it must be remembered that in most text-book structures containing oil are found water sands above, below and between oil sands. It must also be recognized that even the special types of organic matter presumed to be connected with the problem of petroleum genesis can be converted into petroleum only under certain conditions. Trask states "... whatever the particular substances may be that give rise to petroleum, they presumably accumulate in sediments according to the laws governing the deposition of the organic constituents in general." Trask has found that the proportion of organic matter in shale, silts and sands is in the ratio of 4-2-1, with limestones containing approximately the same proportion as shale, and he estimates that only about 10 percent of the organic matter present in normal

sea water is trapped in the sediments. It must further be kept in mind that when first entrapped the organic matter is still acted upon by bacteria and, of course, later, when it is buried to a sufficient depth the bacterial action ceases. In addition, Trask has found that the organic matter in recent sediments averages about 25% by weight. This varies from as high as 35% in the Black Sea to about 1% in Pelagic deposits. The amount of organic matter in oilfield strata ranges from ½% to 5%. The average loss, from recent sediments to ancient sediments, is about 40%. The decrease in the quantity of organic matter is accompanied by a loss of oxygen and nitrogen. Many geologists consider that organic matter must be deposited in a reducing environment and that this in turn leads to a dark color for the sediments. Although dark colored sediments are regarded widely as being probable petroleum source beds, color is not a positive index as to the amount of organic matter.

The consensus of expert opinion is that source beds must have retained a portion of their organic matter, and that the converted portion was from 5% to 10% of the original amount.

Many authors consider that a close relationship exists between coal and oil; that they were originally analogous materials which after deposition received a different treatment. Some of the arguments advanced in favor of this theory are as follows:

(a) It has been thought by some that there is a general geographical and geological relationship between coal and oil, because in a few places oil and coal are found in the same geological formation. This proximity is the exception, however, rather than the rule, and cannot be offered as proof of a close relationship. Usually oil is associated with marine formations and coal with brackish water deposits;

(b) It has been asserted that oil bearing strata pass laterally into coal bearing strata. The evidence in these isolated cases is very weak and extremely doubtful.

(c) Many have concluded that coal and oil were closely related because peat bogs, which are clearly related to coal veins, give off methane, and methane is one of the constituents of gases associated with petroleum.

(d) Another reason offered is that we obtain a product similar to petroleum when we distill coal, lignite and peat and that the hydrogenation of coal will produce petroleum by-products. We now feel reasonably sure that the petroleum source material did not undergo as high temperatures as are necessary in the destructve distillation of coal, lignite or peat.

(e) Petroleum and coal have undergone parallel changes in some regions. This is true but it is coincidental. There are many places where we find alternating marine and brackish beds and these, of course, would be expected to undergo parallel changes.

Trask states that the residual organic matter in older sediments is quite different from the organic matter found in recent or younger sediments. This statement indicates a progressive change in the nature of the organic matter and suggests correspondingly a change in crude petroleum through the ages. The organic mixtures in the young sediments consist of fats, protein, and carbohydrates, while in the older sediments the organic remains appear to be more like complex residual substances and it is suggested that these substances are the ultimate result of bacteriological decay. Certain writers argue that an inherent weakness in the theory of marine origin of oil is that recent sediments appear to be lean in organic matter, but it is not necessary for sediments to be very rich to have enough saprophele to be the source material for large oilfields. It must be remembered that the effective oil or gas closure is volumetrically only a relatively small part of the entire reservoir and also that the total volume of strata which contained source material is relatively large.

There are two widely divergent views on the mode of transformation of organic matter into crude oil.

The Theory of Metamorphism

Illing outlines the chemist-favored theory that after an initial process of putrefaction the entombed organic matter is subjected to temperatures of 100 Centigrade and to reasonably high pressures for long geologic time. There is direct proof that the oil-producing chemical process will not proceed at all under lower temperatures and particularly so at geological temperatures as low as are known to exist. Part of the indirect proof against the theory of metamorphism is that there are large deposits of Pre-Cambrian oil shales which have had the assumed necessary temperatures and pressure and undoubted sufficient time. Other indirect contrary evidence is that in chemical processes as above outlined the resulting residue easily would be identified.

Biochemical Theory

The opposing view attempting to describe the change of organic matter into petroleum is the biochemical theory. This idea depends for validity upon the existence of three conditions for the successful development of a source rock, an ample supply of sediments, a favorable environment for organic life and anaerobic conditions of sedimentation on the sea floor. Such conditions are supplied by basinal areas on the continental shelf marginal to the land masses or to large oceanic islands.

A study of the natural occurrences of hydrocarbons indicates that fifteen normal waxes occur in the essential oils of about twenty-five plant species. Pure normal heptane, used as a standard reference in determining antiknock qualities, is produced from two pine tree species found in the western United States. Biochemists and chemists all consider the finding of chlorophyll prophyrins in petroleum, asphalt and oil shales clear proof that the organic matter which is the source material of petroleum passed rather quickly after deposition into an anaerobic environment because aerobic fermentations destroy chlorophyll porphyrins. Chlorophyll-prophyrin-bearing plants, (algae) existed in Devonian and probably even in Silurian time. Lignites and cannel coals show only traces of chlorophyll porphyrin, which suggest either that source material for petroleum was quite different from that of coal or else that the biochemical conditions accompanying the oil forming process were quite different.

Inorganic Theory

The first inorganic theories were based on the work of the Russian chemist, Mendeleeff, who obtained gaseous and liquid hydrocarbons by treating with hydrochloric acid cast iron high in carbon content. But free hydrochloric acid does not and probably never did exist free in nature. Other chemists have proposed inorganic theories using

some form of catalytic hydrogenating processes, but here again the catalytic agents involved are not known to exist in nature. Strong arguments against the inorganic theories were formulated by Engler and Hofer. A summary follows:

a. Petroleum never occurs in primary or unaltered igneous rocks, but always in sedimentary or in a few instances in altered igneous rocks.
b. Hydrogen has never been found in oilfield gases, as it should occur according to the carbide and hydrogenation theories.
c. Certain components are found in petroleum which are optically active, as well as nitrogen compounds, the origin of which it is impossible to explain according to the inorganic theories.

The composition of natural gas accompanying petroleum has a definite bearing on the genesis of petroleum. It contains no trace of hydrogen, carbon monoxide, or ethylene; gas formed by the pyrolysis of fatty acids, or natural fats as in Engler's experiments, contains all three of these substances.

There are three methods of approach to the problem of petroleum genesis: (1) by the study of the various kinds of oil and bituminous material, found in nature, and by attempting to separate their components, even though occurring in small amounts (2) by studying petroleum deposits and bituminous strata in general with object of finding the source rock of petroleum, and (3) by studying certain phenomena of fossilization which occur even today and which will enable us to discover the mother substance.

One of our best clues is a study of the nitrogen compounds found in petroleum, because all nitrogen compounds of nature are of either animal or vegetable origin. We have long known that petroleum contains small quantities of certain optically active substances, and we must accept this as definite proof of the animal or plant origin for petroleum, since only in the bodies of plants or animals are optically active compounds formed. No porphyrins are found in the petroleum produced from the very old formations; Pennsylvanian, Mississippian, Devonian or Ordovician; which suggests that the long duration of time has decomposed these chemical compounds. The suggested conclusion from a study of the porphyrins is that petroleum is of plant origin. A study of porphyrins also tends to prove the low temperature history of petroleum. Further, intimately associated with oil we find salt water rich in sulphuretted hydrogen, and with a high iodine content. Waters occurring in petroleum deposits must be considered as fossil water, and their formation must be correlated somehow with the appearance of oil. Deposit waters contain from 50 grams to 135 grams of iodine per cubic meter. Since iodine cannot be derived from salt massifs or from fresh water, the source of iodine must be elsewhere; sea water does contain a trace of iodine, and certain marine plant life extracts the iodine from the sea water and forms complex organic compounds. Thus it is suggested that when the plants are subjected to bituminization, the iodine remains in the fossils water in a concentrated form.

The second method of approach has been followed by Potonies. His saprophilic theory is summarized as follows: The raw materials forming saprophele are plankton and nekton, and possibly algae as found in a part of the Black Sea. The body of the plankton consists mainly of protein and smaller amounts of fat and carbohydrates. This abundant plankton settles in strictly anaerobic conditions, in a medium poisoned by sulphuretted hydrogen. Here it is subjected to the action of bacteria living only in the total absence of oxygen. An examination of this Black Sea mud by two Russian authors showed from 9 to 31 percent calcium carbonate and from 23 to 35 percent organic matter. Of this organic matter 10 percent is soluble in benzine. The solution is still green because the chlorophyll is still unchanged. When the solution is evaporated, the residue is a bitumen which consisted mostly of hydrocarbons. According to another Russian author, the Tertiary in the North Caucasus, which is considered the source rock of petroleum in that region, has a composition similar to Black Sea mud. This stratum shows signs of sulphuretted hydrogen fermentation. While the fate of the organic material after sedimentation is entirely unknown, it is quite probable that both chemical and biological changes occur and that these phenomena of change are probably speeded with time due to increased pressure of overburden. This pressure and increased depth below the surface correspondingly increase the temperature. The conclusions of Van der Gracht on the genesis of petroleum are here to the point. Briefly, they are: Two sources obtain, (1) the Euxinic, Black Sea facies, which he states have existed locally in the seas throughout geologic time and (2) a Saline facies in which the sea floor was covered by strong saline concentrations. Both facies have in common that organic life is confined to the upper horizons of more normal water, while the bottom layers are more or less devoid of oxygen. Under these circumstances, the organic matter which falls to the bottom is preserved from the scavengers usually present and thus becomes fossilized. Van der Gracht suggests that oil field waters, which are so high in sodium chloride, calcium, iodine and bromine salt content are not simple fossil sea water, but sea water plus a segregation product of the original organic material, organisms which have concentrated these rare constituents of sea water.

Facts and observations regarding the physical properties of petroleum which must be considered are these: Barton notes that petroleum derived from vegetable matter of sandy shales and stored in sandstone reservoirs is of high gravity and of paraffine base, whereas oil derived from calcareous beds and stored in limestone beds is generally of much lower gravity with a tendency toward an asphaltic base. It was found by Barton that the variation of the character of normal Gulf Coast crude oil is a function of depth and age, and that in the oils of the same age, whether Miocene, Oligocene or Eocene, there is generally a progressive increase in the content of the lighter constituents with depth and a corresponding decrease in the heavier constituents, and that in oil of the same depth there is a tendency toward an increase of the lighter constituents and a corresponding decrease in the heavier portions with increasing age. Pratt observes that recently formed sediments commonly manifest much higher temperatures than are observed at corresponding depths beneath the surface in older rocks. The geologically young and incompletely consolidated rocks of the Gulf Coast region, for example, are conspicuously hotter than the older dense

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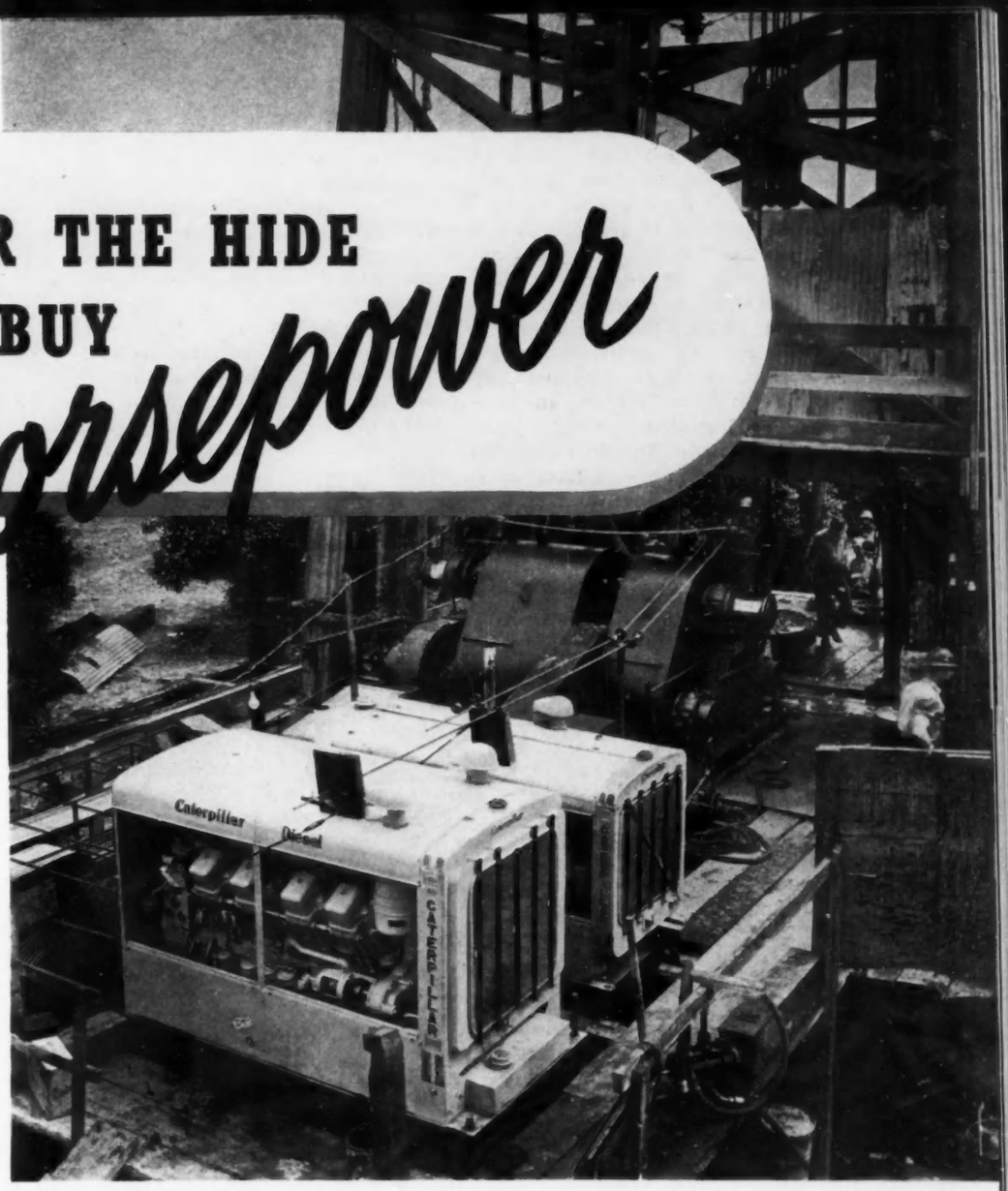

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rocks of the Mid-Continent region or of West Texas. Movement of rocks, with resultant friction, is a possible source of this heat. Rocks which have long been quiescent are cool. Together with deep burial, movement, caused either by compaction or local deformation, is the most commonly proposed explanation for high temperatures.

Pratt's writings on the subject of the origin of oil should be considered here. He suggests that the first stage of petroleum development after deposition is analogous to commercial cracking operations, as a result of which part of the organic matter in the sea-bottom muds and oozes of ordinary sedimentary processes are converted by cracking into gaseous and heavy liquid hydrocarbons. This stage may be considered to be contemporaneous with or immediately to follow the period of greatest volume reduction in the new sediments, during and as the result of initial compacting. As compaction proceeds the gas and part of the oil cracked from the source material move out of the muds and into the pore spaces of adjacent sands along with other fluids. A second long continued stage is analogous to the "hydrogenation" processes in commercial refinery operations, during which the heavy unsaturated oils, characteristic of our geologically young oil fields and presumably generated in the first stage, are enriched in hydrogen. Cracking continues during this stage and there results a slow transformation, through various stages, into petroleum.

Pratt quotes Wilde's theory of methylation, which is that methane might act to increase the hydrogen content under natural conditions in oil reservoirs. Wilde proposes that crude oil may react with some of its associated methane, either directly or through an intermediate state to enrich itself in hydrogen.

Epochal work on the subject of organic remains found in crude oil has been done in recent years by McConnell Sanders, who has spent much time in actual research on this problem. It was my privilege recently to read a summary of his paper to this group and, although Sanders regards his studies as preliminary and of an exploratory nature, I feel that his conclusions are more than worth quoting here, both because they are so pertinent to the subject under discussion and because a continuation of his research by members of this group might be encouraged:

"Taking first the genesis of petroleum, there is evidence pointing to the extreme probability that spores and unicellular algae have contributed their waxy, fatty, resinous or oil secretions to the eventual petroleum complex, leaving only their decay resistant integuments behind.

The presence of oil, usually strongly colored by yellow, red or orange pigments, in unicellular algae is well known, and it cannot be entirely without significance that many of these have a habitat which would facilitate their inclusion in the sedimentary magma wherein the liberation of their oil contents could take place.

According to Fritsch, the resting places in the life cycle of certain algae are represented by spores whose cell contents become laden with food reserves and frequently harbor quantities of yellowish-red oil. Bristol shows that they are able to withstand long periods of drying and retain their vitality for a long time.

Some of the forms of unicellular organisms found in oil may be representative of these oil secreting algal bodies, and their identification as such would be of great interest. It would thus appear to be of special interest to study the composition and chemistry of algal fatty components in order to discover the mechanism of their transformation into hydrocarbons. The characteristic colors of oils might similarly be traced to the pigments which are so prominent a feature of these natural oils.

The theory of Murray Stewart that the crude oils of Burma owe their origin to the natural oil secreted by dipterocarpus trees, appears to receive some amount of confirmation from the results of my investigations, as does the theory as set forth in his book relating to the silicification of the wood, except that, as shown by the theory of McConnell Sanders, complete molecular replacement of the wood substance by silica need not necessarily have taken place, since the oil was able to capture and retain an intermediate stage. Here also is indicated a subject for further research involving a chemical investigation of dipterocarpus oil in order to trace its conversion into petroleum. The presence of resins in a large number of crude petroleums is another subject which invites further investigation."

Sanders mentions the possibility of characterizing oils by means of the types of organisms of which they carry the preserved remains. He secured some of these results by comparing the types of organisms found in the crude oils with the types of organisms found in cores from the producing formations and from the shales above and below.

The theory of A. Wright and P. W. K. Sweet that the Jurassic is the source of oil both in Cuba and Mexico, as well as Colombia, Venezuela, and Southwestern Texas, may receive some confirmation from the results of his study. According to the theory, the Jurassic oil has been driven from its source beds into the overlying strata as a result of igneous intrusion; the coke-like fragments found by Sanders in a sample of Jurassic oil in Mexico may well represent the product of such intrusions. Further, it was observed that in several Cretaceous Mexican oils, the chitinous limbs of an insect similar to Acarina were found, and in a core, taken from the Jurassic producing formation of a well, the whole insect was discovered.

In the case of Roumanian oils there is a striking similarity between some of the organisms carried by the oils producing from the Miocene, and those carried by the Miocene oils of Mexico. This, however, is a matter for further research, since an insufficient number of Roumanian oils have as yet been examined to warrant any definite conclusions.

Conclusion

In conclusion, I feel that the preponderance of evidence points to the bacterial theory as explaining the genesis of petroleum. The first phase of transformation results in heavy crudes and gases of various compositions. The evidence is poor as to the processes involved in the second and succeeding stages. Bacterial activity may continue or the hydrogenating action described by Pratt and Wilde may carry on, or possibly a combination of both the bacterial activity and hydrogenation occurs. There is some proof of the continuance of bacterial activity; a Russian author, Archangelsk, found definite evidence of sulphuretted hydrogen fermentation in Tertiary rocks in North Caucasus, which are considered the source rocks of petroleum in that region, and Lippman and Greenberg report finding active bacteria

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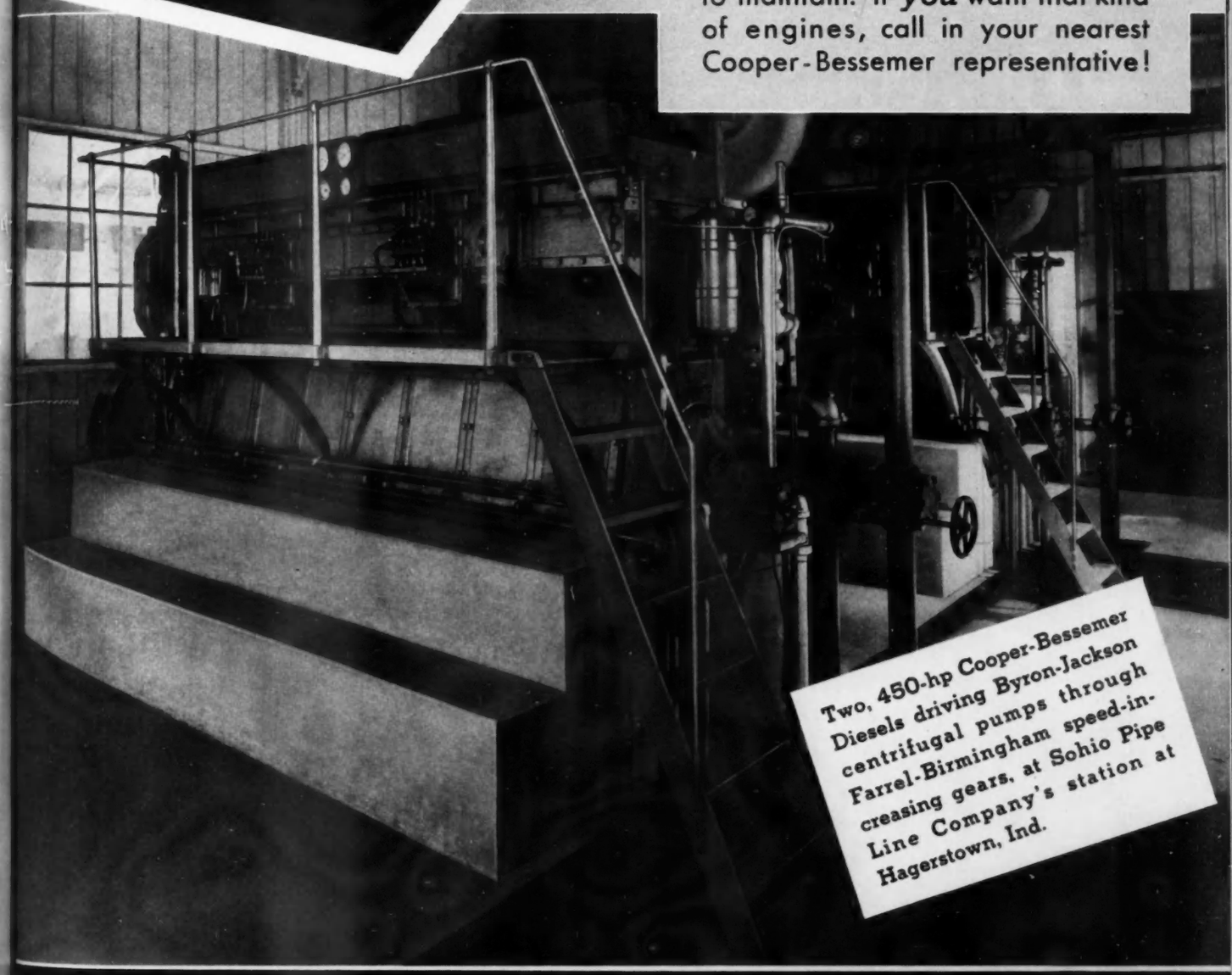

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in petroleum produced from 8700 feet. Bastin reports finding bacteria in Illinois oil field waters. Brooks, however, calls attention to the fact that unfortunately the poorer the experimental technique the deeper bacteria are likely to be reported.

From the very nature of the hydrogenation process we cannot expect to find any evidence of it.

The study of petroleum, even should it not reveal the origin thereof, has a definite potential economic value, for should we reach a point in our studies when we can state definitely that a given crude petroleum is of a certain geological age, we will have an obviously useful tool in our search for oil. For example—if we should find Eocene oil in Oligocene strata we would be warranted in recommending testing the Eocene.

In the light of the points made in this paper it appears that the correct approach to the general problem of petroleum genesis must of necessity involve careful physical study and examination of oils from various depths for living bacteria, and that the researches of McConnell Sanders into the organic remains found in crude petroleum and in the Earth's strata must be carried on.

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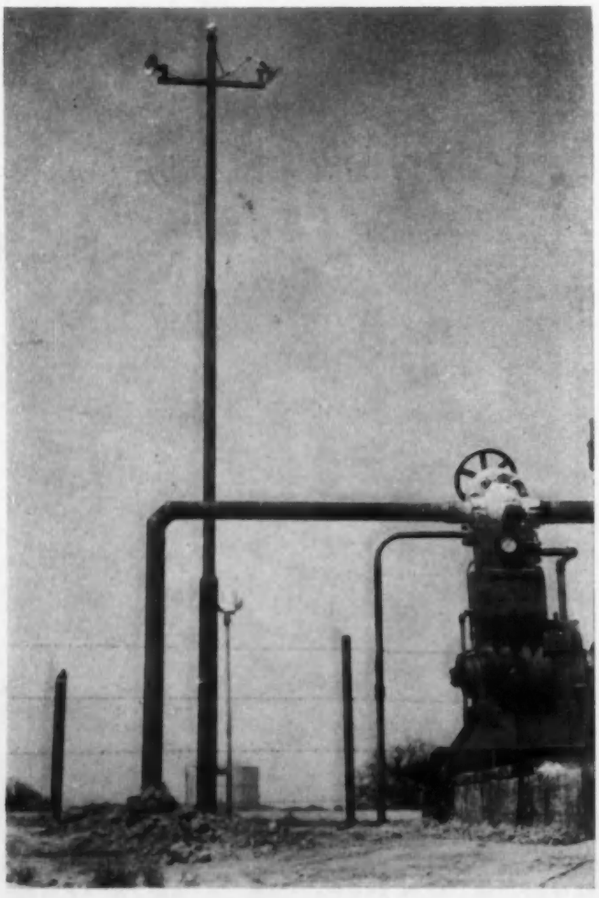
Temporary Six-Volt Lighting Unit Cuts Production Costs



UNTIL the future drilling program had been definitely established in a certain out-post area in a California field, one of the major companies operating there effected a definite saving in the production cost of their first well by installing this cheap, easily-built 6-volt lighting system. It was not considered economical or practical to set poles and bring in a line from the nearest power line which was nearly a quarter of a mile distant until more wells were drilled in the area.

As shown in the accompanying photograph a 15-foot welded pipe standard with a cross-arm near the top, was centrally located and set near the gas-driven equipment that needed the pumpers' attention during the night. On the cross-arm were mounted two adjustable automobile spot-lights which were focused on the desired points near the well equipment or tanks. A heavy gauge, well insulated wire was brought from the battery through a length of conduit laid beneath the ground, up to a safety switch mounted on the standard, and up through the latter to the top of the pole.

The relatively few minutes of use each night makes it possible to use the storage battery for two to three months without having to recharge it. Since the well is several miles from the nearest company garage or tool-house, the extra battery also serves as an important stand-by unit should the regular battery on the engine fail.

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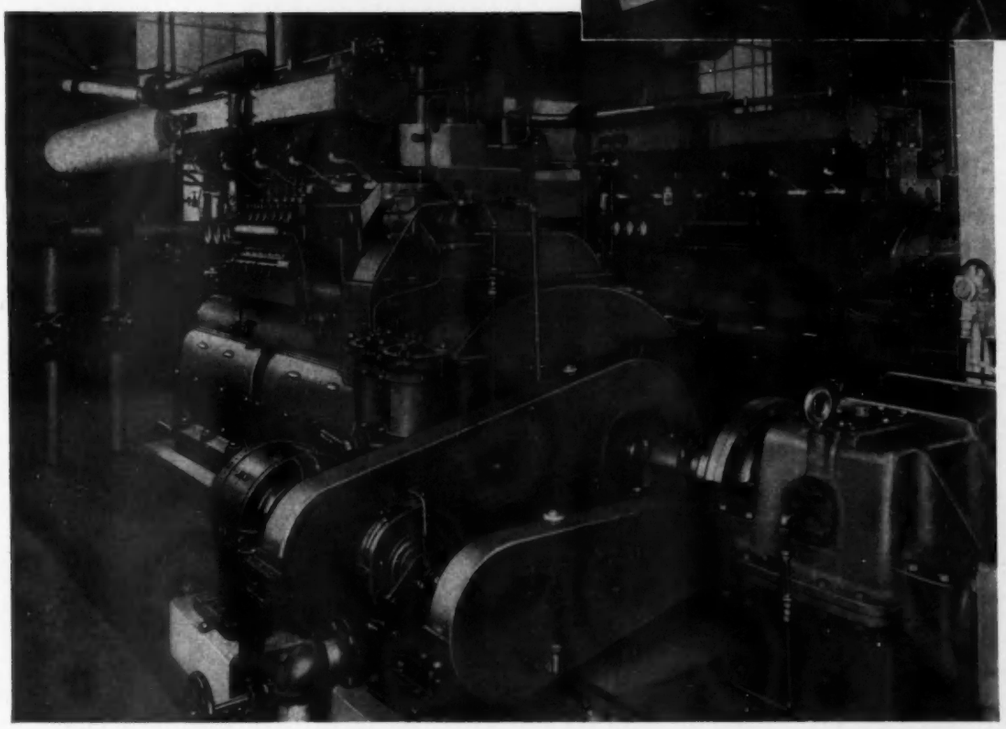

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Basic Principles in Acid Treating Limes and Dolomites

By J. B. STONE, Chief Chemist, and
D. G. HEFLEY, Assistant Director of Research
Dowell, Incorporated

THE process of acidizing oil and gas wells with hydrochloric acid has developed in a remarkably short period of time from an unreliable experimental procedure to a scientific and highly successful method of increasing production. This rapid progress is attributable primarily to intensive and unceasing research on the numerous chemical problems involved in acidizing.

In acidizing, predominantly limestone formations are treated with hydrochloric acid for the purpose of dissolving a portion of the formation and thereby increasing the porosity and permeability. When such an increase is achieved, there is a resultant increase in production at the same rock pressure, for the flow of gas and oil through a formation is inversely proportional to the permeability.

One of the factors which determines the ultimate success of an acidizing treatment is the distance to which the acid penetrates back into the formation. Because of unknown conditions in the producing formation, particularly variations in porosity and permeability, it is impossible to determine accurately how far the acid penetrates the formation in an actual treatment. However, if it is assumed that the formation has uniform porosity and permeability in all directions and consequently that all the pores within a certain radius of the well are filled with acid, and that none of the acid goes farther back into the formation than that radius, then the distance to which a given amount of acid will penetrate into a formation can be calculated. In Figure 1 are several curves based upon the above assumptions which show the distances that different quantities of acid will penetrate into a ten-foot thickness of formation. Each curve represents a definite assumed porosity, and it shows for that particular porosity the distance to which various quantities of acid will penetrate into the formation.

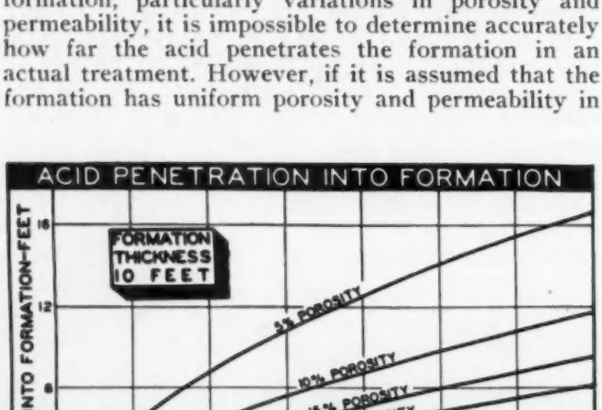

FIGURE 1

These curves show for the various percents of porosity indicated, the distance of hydrochloric acid penetration into a formation 10 feet in thickness, assuming uniform porosity and permeability.

In an actual treatment the acid would never behave exactly in this manner, as some of the pores would undoubtedly be penetrated considerably farther than would some of the others. Consequently, there is probably a very irregular penetration, with the distances varying both horizontally and vertically.

Choice of Treating Acid

Although theoretically it would seem to be possible to use any one of several acids for the purpose of acidizing a formation, certain practical considerations combine to make the selection of hydrochloric acid almost compulsory. In the first place, hydrochloric acid is relatively inexpensive compared to many other acids. Also, no highly insoluble precipitates are formed from pure limestone, and this is important because any such precipitates would tend to plug the flow channels and thus nullify the benefits derived from acidizing. Furthermore, the corrosive effect of hydrochliroic acid upon metals may be inhibited to such an extent that it is rendered negligible.

Among the other acids which might be considered for acidizing purposes are the industrially important nitric and sulphuric acids. Nitric acid, however, has greater hazards for its handlers than hydrochloric acid because upon contact with the skin it causes a more severe burn; and also, its cost is much greater than that of hydrochloric acid.

When sulphuric acid reacts with limestone, calcium sulphate is formed as a product.

$$H_2SO_4 + CaCO_3 = CaSO_4 + H_2O + CO_2$$

Inasmuch as calcium sulphate is practically insoluble in water, it is impracticable to use sulphuric acid as an acidizing agent, for the precipitate would tend to

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Again, Schlumberger gratefully acknowledges the cooperation of the petroleum industry.

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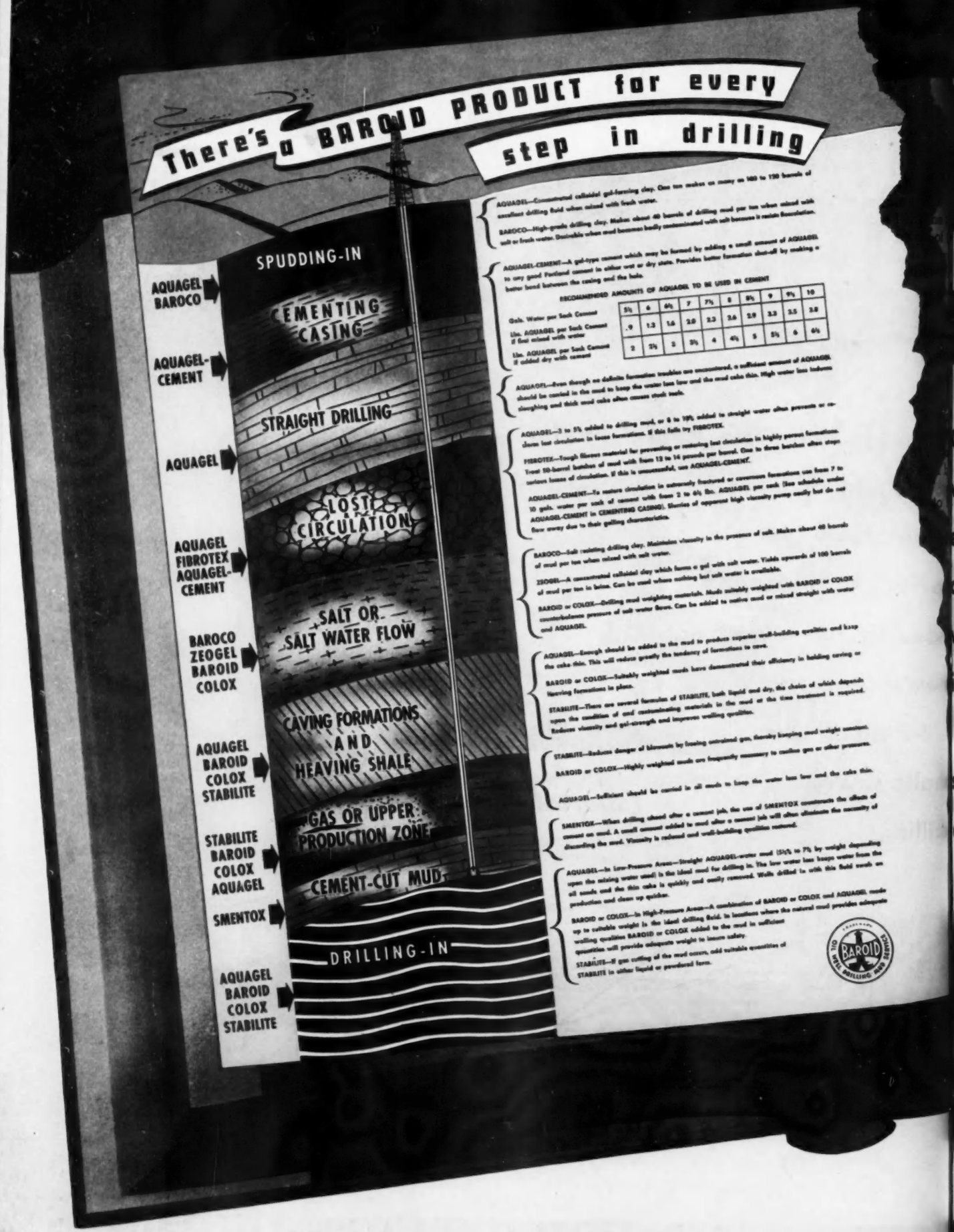
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AQUAGEL—Concentrated colloidal gel-forming clay. One ton makes as many as 160 to 170 barrels of excellent drilling fluid when mixed with fresh water.
BAROCO—High-grade drilling clay. Makes about 40 barrels of drilling mud per ton when mixed with salt or fresh water. Desirable when mud becomes badly contaminated with salt because it resists flocculation.
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RECOMMENDED AMOUNTS OF AQUAGEL TO BE USED IN CEMENT
Gals. Water per Sack Cement
Lbs. AQUAGEL per Sack Cement if first mixed with water
Lbs. AQUAGEL per Sack Cement if added dry with cement
5½ 6 6½ 7 7½ 8 8½ 9 9½ 10
.9 1.3 1.6 2.0 2.3 2.6 2.9 3.3 3.5 3.8
2 2½ 3 3½ 4 4½ 5 5½ 6 6½
AQUAGEL—Even though no definite formation troubles are encountered, a sufficient amount of AQUAGEL should be carried in the mud to keep the water loss low and the mud cake thin. High water loss induces sloughing and thick mud cake often causes stuck tools.
AQUAGEL—2 to 5% added to drilling mud, or 6 to 10% added to straight water often prevents or recovers lost circulation in loose formations. If this fails try FIBROTEX.
FIBROTEX—Tough fibrous material for preventing or restoring lost circulation in highly porous formations. Treat 50-barrel batches of mud with from 12 to 14 pounds per barrel. One to three batches often stop serious losses of circulation. If this is unsuccessful, use AQUAGEL-CEMENT.
AQUAGEL-CEMENT—To restore circulation in extremely fractured or cavernous formations use from 7 to 10 gals. water per sack of cement with from 2 to 6½ lbs. AQUAGEL per sack (See schedule under AQUAGEL-CEMENT in CEMENTING CASING). Slurries of apparent high viscosity pump easily but do not flow away due to their gelling characteristics.
BAROCO—Salt resisting drilling clay. Maintains viscosity in the presence of salt. Makes about 40 barrels of mud per ton when mixed with salt water.
ZEOGEL—A concentrated colloidal clay which forms a gel with salt water. Yields upwards of 100 barrels of mud per ton as below. Can be used where nothing but salt water is available.
BAROID or COLOX—Drilling mud weighting materials. Muds suitably weighted with BAROID or COLOX counterbalance pressure of salt water flows. Can be added to native mud or mixed straight with water and AQUAGEL.
AQUAGEL—Enough should be added to the mud to produce superior wall-building qualities and keep the cake thin. This will reduce greatly the tendency of formations to cave.
BAROID or COLOX—Suitably weighted muds have demonstrated their efficiency in holding caving or heaving formations in place.
STABILITE—There are several formulas of STABILITE, both liquid and dry, the choice of which depends upon the condition of mud contaminating materials in the mud or the time treatment is required. Reduces viscosity and gel-strength and improves wetting qualities.
STABILITE—Reduces danger of blowouts by freeing entrained gas, thereby keeping mud weight constant.
BAROID or COLOX—Highly weighted muds are frequently necessary to confine gas or other pressures.
AQUAGEL—Sufficient should be carried in all muds to keep the water loss low and the cake thin.
SMENTOX—Where drilling ahead after a cement job, the use of SMENTOX counteracts the effects of cement on mud. A small amount added to mud after a cement job will often eliminate the necessity of discarding the mud. Viscosity is reduced and wall-building qualities restored.
AQUAGEL—In Low-Pressure Areas—Straight AQUAGEL-water mud (5½% to 7% by weight depending upon the mixing water used) is the ideal mud for drilling in. The low water loss keeps water from the oil sands and the thin cake is quickly and easily removed. Wells drilled in with this fluid result in productions and clean up quicker.
BAROID or COLOX—In High-Pressure Areas—A combination of BAROID or COLOX and AQUAGEL made up to suitable weight is the ideal drilling fluid. In locations where the natural mud provides adequate wall-building qualities BAROID or COLOX added to the mud in sufficient quantities will provide adequate weight to insure safety.
STABILITE—If gas cutting of the mud occurs, add suitable quantities of STABILITE in either liquid or powdered form.
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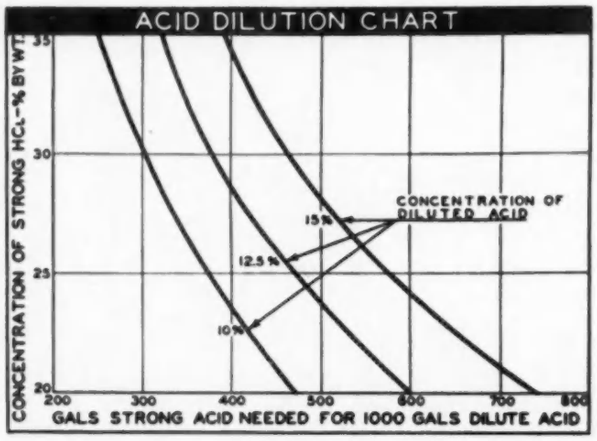

FIGURE 2

In this chart are given the quantities of concentrated hydrochloric acid required to produce 1000 gallons of diluted acid of the various concentrations usually used in acidizing treatments of oil wells.

plug the pores. Therefore, a much smaller increase in porosity and permeability could be expected as a result of such a treatment than if hydrochloric acid were used.

The undesirable and harmful reaction between hydrochloric acid and iron well equipment was a stumbling block which delayed the widespread adoption of acidizing by the oil producing industry for many years. However, the use of suitable acid inhibitors eliminated this corrosion problem and enabled the acidizing process to attain its present prominence.

While there are numerous inhibitors in present day usage, most of the effective inhibitors used in acidizing are organic compounds. With hydrochloric acid containing 1 percent or less of an efficient inhibitor, the reaction or corrosion rate between acid and steel is only 1 to 2 percent as much as with regular acid. At 150° Fahrenheit the corrosion loss of mild steel in raw 15 percent hydrochloric acid is about 1.5 pounds per square foot per day, while with effectively inhibited 15 percent hydrochloric acid it is 0.025 pounds or less. The reaction between the formation and acid is not affected in any way.

Commercial hydrochloric acid is usually between 28 percent and 32 percent by weight hydrogen chloride, but it is sometimes prepared in concentrations as high as 42 percent and shipped under pressure. In acidizing treatments, the acid is usually diluted to 12 percent to 15 percent. Figure 2 shows the quantity of strong acid which must be diluted in order to obtain 1000 gallons of acid of the concentration proper for use in well treating. The specific gravity of hydrochloric acid solutions of various concentrations is illustrated in Figure 3.

Acidizing Reactions

When hydrochloric acid is brought into contact with limestone, a chemical reaction takes place, the products of which are calcium chloride, carbon dioxide, and water. Since calcium chloride is soluble in water and carbon dioxide is a gas, the reaction of limestone with acid in effect allows the removal of solid limestone as a liquid. When the spent acid is withdrawn following an acid treatment, there is a consequent permanent physical change in the formation, and the permeability and porosity of the formation are increase because part of the formation is removed.

None of the oil reservoirs composed of limestones are pure calcium carbonate. Some, which are called dolomitic formations, contain high percentages of magnesium carbonate, and they respond in a somewhat different manner to acid than limestone. The rate of reaction is usually much slower on dolomitic formations than on limestones.

The chemical equation for the reaction between limestone and hydrochloric acid is as follows:

$$\underset{73}{2HCl} + \underset{100}{CaCo_3} = \underset{111}{CaCl_2} + \underset{18}{H_2O} + \underset{44}{CO_2}$$

This equation means that two molecules of hydrogen chloride react with one molecule of calcium carbonate to form one molecule of calcium chloride, one molecule of water and one molecule of carbon dioxide. The figures shown below each of the compounds represent the relative weights of the individual molecules, and, therefore, the relative weights of substances which react or are formed as products of the reaction. Hence, the equation may be interpreted as saying that 73 pounds of hydrogen chloride react with 100 pounds of calcium carbonate to form 111 pounds of calcium chloride, 18 pounds of water, and 44 pounds of carbon dioxide.

The usual acid treating solution contains 15 percent hydrogen chloride by weight and has a specific gravity of 1.075. In 1000 gallons of such acid, there are $1000 \times 8.333 \times 1.075 \times 0.15$, or 1343.2 pounds of hydrogen chloride. From the relative weights of the substances involved in the reaction between hydrochloric acid and limestone as given above, it can be calculated by proportion that 1343.2 pounds of hydrochloric acid react with 1840 pounds of calcium carbonate, forming 2042.4 pounds of calcium chloride, 331.2 pounds of water and 809.6 pounds of carbon dioxide.

As the average density of limestone is 170 pounds per cubic foot, the 1840 pounds of calcium carbonate represent a volume of 10.82 cubic feet. When it is realized that this amount of material is removed from the pores and channels of the formation surrounding the bore hole by the action of 1000 gallons of 15 percent acid, it is easier to understand the large increases in porosity and permeability which are

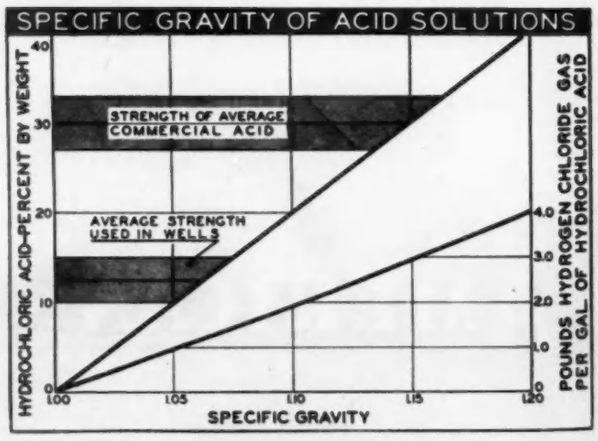

FIGURE 3

In this figure the percent by weight of hydrochloric acid and also the weight of hydrogen chloride gas per gallon of acid are plotted against the specific gravity of various solutions.

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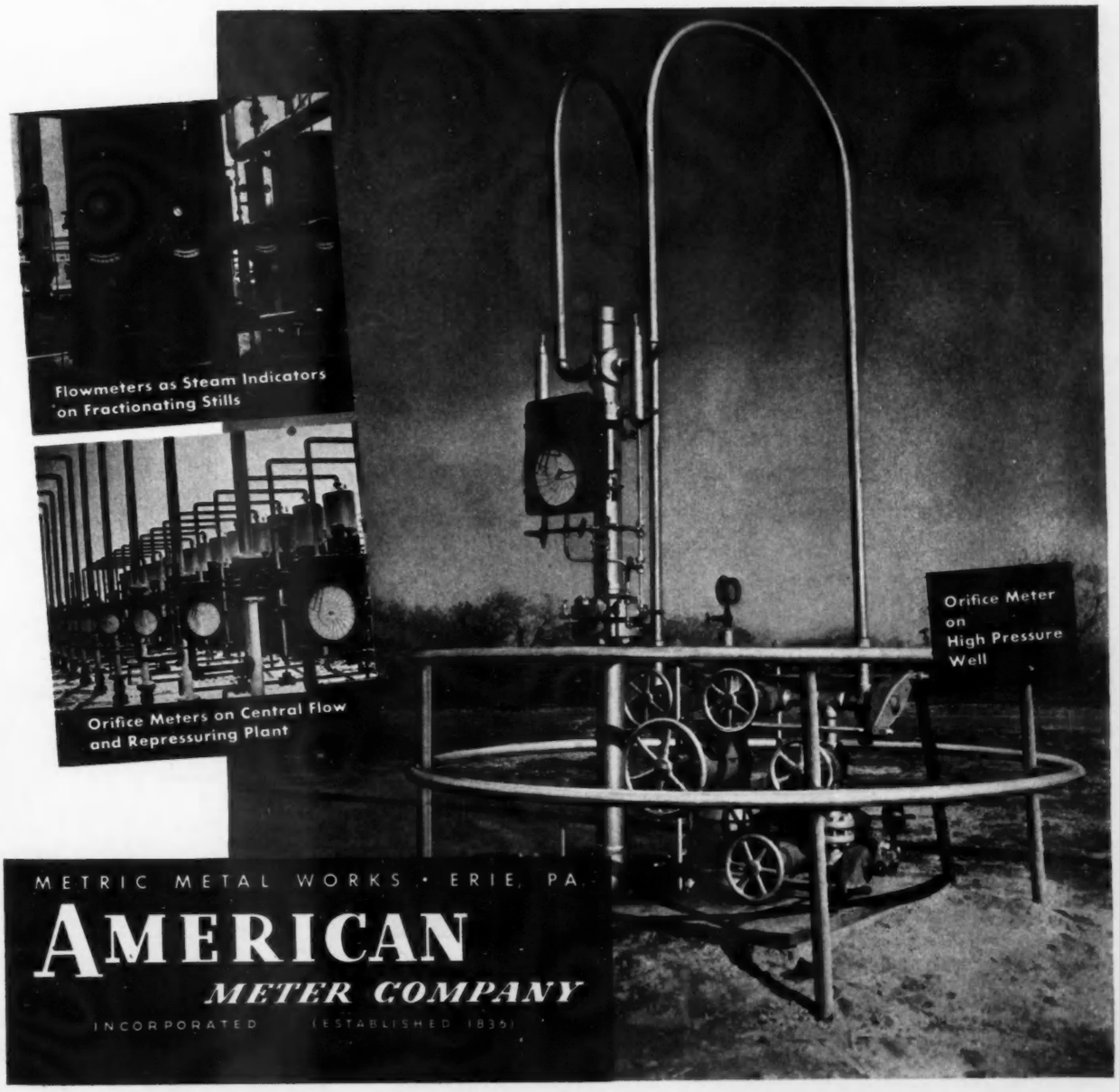
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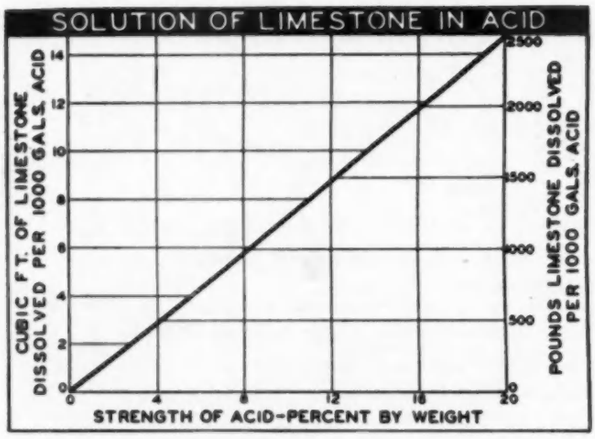

FIGURE 4

The quantity of limestone dissolved by 1000 gallons of hydrochloric acid varying in concentration from zero to 20 percent is given in cubic feet of volume and also in pounds.

obtained by acidizing. The amount of limestone which will be removed by 1000 gallons of acid of any strength from 0-20 percent is shown in Figure 4.

The 809.6 pounds of carbon dioxide formed during the reaction of 1000 gallons of 15 percent hydrochloric acid on 1840 pounds of calcium carbonate occupy 6636 cubic feet at standard conditions (0 degrees Centigrade and 760 millimeters of mercury pressure). The solubility of carbon dioxide in the spent acid depends upon several factors but as shown in Figure 5, it is directly proportional to the pressure and inversely proportional to the temperature.

The heavy vertical line near the center of the chart represents the volume of carbon dioxide produced when one gallon of 15 percent hydrochloric acid reacts with limestone. At any conditions of temperature and pressure which fall to the right of this vertical line, all the carbon dioxide generated by the acidizing reaction is soluble in the spent acid; to the left of this line all of the carbon dioxide will not be soluble in the spent acid, and there will be some gaseous carbon dioxide present. From one of the curves, it is seen that at 95 degrees Fahrenheit, 825 pounds pressure are required to dissolve all the carbon dioxide produced from one gallon of acid in its own spent acid solution; and at higher temperatures, higher pressures are required to accomplish this result.

Dolomitic formations also are acidized successfully. In many areas, particularly West Texas and Western Kansas, oil is produced from a dolomitic limestone formation. Chemically, these formations differ from a true limestone in that in addition to the limestone, they contain varying amounts of the mineral dolomite, which is calcium magnesium carbonate, $CaMg(CO_3)_2$. When dolomite reacts with hydrochloric acid, the same products of reaction are formed as when limestone reacts, except that magnesium chloride also is formed, as shown by the following equation:

$$\underset{184.3}{CaMg(CO_3)_2} + \underset{146}{4HCl} = \underset{111}{CaCl_2} + \underset{95.3}{MgCl_2} + \underset{36}{2H_2O} + \underset{88}{2CO_2}$$

Magnesium chloride is quite soluble in water and so, as in the case of pure limestone, all the products of the reaction are either soluble in the spent acid or are gaseous. From the relative weights of the molecules shown below the above equation, it can be calculated that 1000 gallons of 15 percent hydrochloric acid (1343.2 pounds of hydrogen chloride) will react with 1695.5 pounds of pure dolomite to form 1021.2 pounds of calcium chloride, 876.7 pounds of magnesium chloride, 331.2 pounds of water and 809.6 pounds of carbon dioxide.

Limestone and dolomitic formations frequently contain small quantities of other materials. Some of these, such as the oxides of aluminum and iron, form readily soluble chlorides upon reaction with hydrochloric acid. Although ferric oxide and aluminum oxide form chlorides which are soluble in acid, when the acid becomes nearly spent, the flocculent and voluminous precipitates of aluminum and ferric hydroxide are formed. This reprecipitation is undesirable for it may cause plugging of the pores. When acid treating formations contain large amounts of iron or aluminum, it is desirable to prevent this possibility of plugging the pores by either withdrawing the acid from the formation before it has become completely spent, or by adding a stabilizing agent to the acid which will prevent the precipitation of iron or aluminum hydroxide from completely spent acid.

Other substances, such as sand, granite, chert, clay, and shale, are not appreciably soluble in regular hydrochloric acid. Anhydrite and gypsum, which are prevalent in many dolomitic formations, are slightly soluble in hydrochloric acid, but it is difficult to effect the removal of an appreciable quantity of these substances because the reactions are quite slow. Anhydrite is calcium sulphate ($CaSO_4$), the same substance which is formed by the reaction between sulphuric acid and limestone. Gypsum is calcium sulphate which has water of crystallization in the molecules ($CaSO_4.2H_2O$).

The solubility of calcium sulphate in hydrochloric acid solutions of various strengths is shown in Figure 6. It may be seen from this curve that the solubility is almost ten times as great in 15 percent acid as it is in water alone. As the acid concentration decreases during a treatment, the solubility of the calcium sulphate also decreases. Thus calcium sulphate which was dissolved in the acid at the begin-

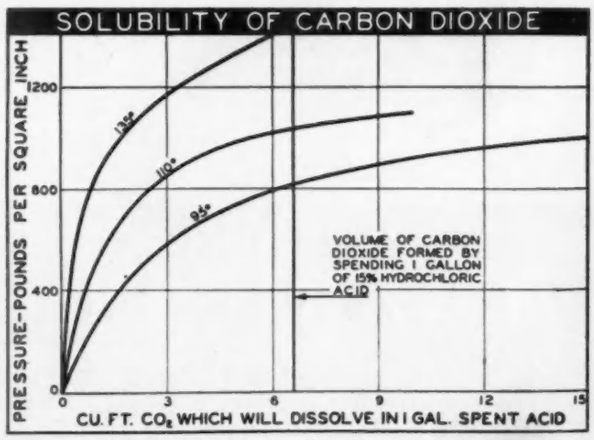

FIGURE 5

When existing pressure and temperature conditions are such that they lie to the right of the heavy vertical line, all carbon dioxide produced will be dissolved in the spent acid.

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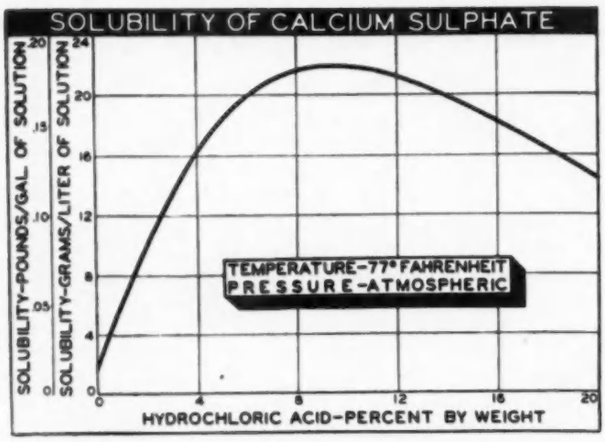

FIGURE 6

This curve illustrates the effect of hydrochloric acid concentration on the solubility of calcium sulphate. Solubility in acid of the usual treating strength is much greater than in spent acid.

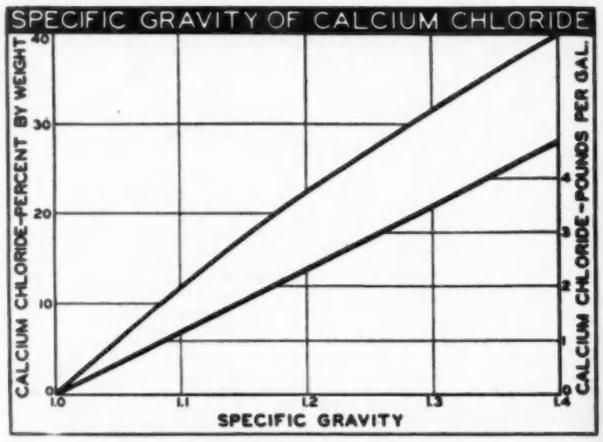

FIGURE 7

As these curves clearly demonstrate, when the concentration of calcium chloride in water is increased, the specific gravity of the solution is increased also, and the relationship is almost linear.

ning of a treatment would precipitate out as the acid becomes spent, if a saturated solution was formed in the concentrated acid.

Spent Acid Solution

Previously it has been calculated that when 1000 gallons of hydrochloric acid solution react with limestone, 331.2 pounds of water are produced. This is equivalent to 39.75 gallons. Besides this, it must be remembered that 15 percent hydrochloric acid contains 85 percent of water by weight, and this water is not shown in the equation. Thus, 1000 gallons of 15 percent acid contain $1000 \times 1.075 \times 0.85$, or 913.75 gallons of water. The total quantity of water which is present in the spent acid solution is, therefore, $39.75 + 913.75$ or 953.5 gallons.

In this water are dissolved the soluble products of the reaction making up the spent acid solution. The principal soluble product is calcium chloride, but in the case of dolomitic formations, magnesium chloride as well is dissolved in the water.

When 1000 gallons of 15 percent acid are completely spent on limestone, there are formed 2041 pounds of calcium chloride, which, when dissolved in the 953.5 gallons of water, form a spent acid solution containing 20.4 percent calcium chloride by weight, and having a specific gravity of 1.181. Although on first thought it may seem that this is a strong solution, actually there are only 2.01 pounds of calcium chloride in each gallon of solution. Several times this much calcium chloride can be dissolved in water before a saturated solution is obtained. Figure 7 shows the relationship between specific gravity and concentration for calcium chloride solutions.

The proper acid concentration to be used in treating a formation can often be determined on a basis of the physical properties desired in the resulting spent acid solution. Viscosity is an important property as highly viscous spent acids are much more difficult to remove from the formation than are spent acids of low viscosity. Spent acid solutions with high viscosities are produced from acids of high concentrations, for the calcium chloride content increases as the acid concentration increases. In Figure 8 the viscosity is plotted against the concentration of calcium chloride solution. From the slope of this curve it may be seen that for equal small increases in calcium chloride concentration, there are larger increases in viscosity at high calcium chloride concentrations than at low ones. In other words, the effect on the viscosity grows more pronounced as the acid concentration increases.

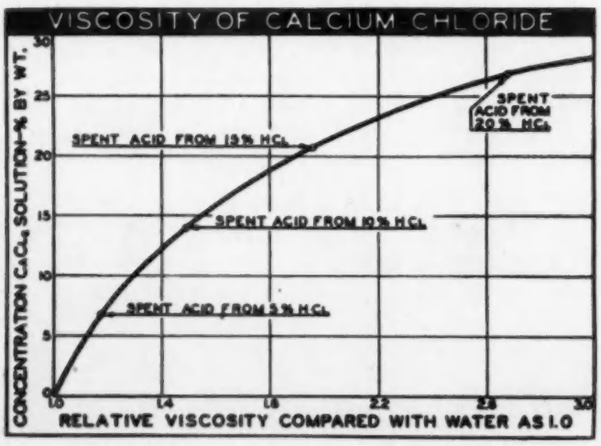
VISCOSITY OF CALCIUM CHLORIDE
CONCENTRATION $CaCl_2$ SOLUTION-% BY WT.
SPENT ACID FROM 15% HCl
SPENT ACID FROM 10% HCl
SPENT ACID FROM 5% HCl
SPENT ACID FROM 20% HCl
RELATIVE VISCOSITY COMPARED WITH WATER AS 1.0

FIGURE 8

The viscosity increases as the concentration of calcium chloride in the neutral spent acid increases, and, therefore, treating acids of high concentration produce spent acid solutions of high viscosity.

Heat of Reaction

By using data obtained from the Handbook of Chemistry and Physics, published by the Chemical Rubber Publishing Company, regarding the heat of formation and solution of the various individual compounds involved in acidizing reactions, the heat which is evolved when acid reacts with limestone or

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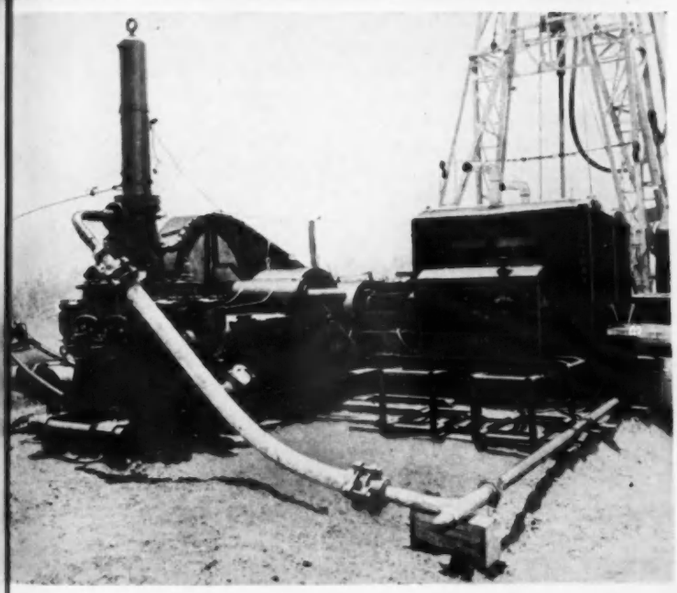

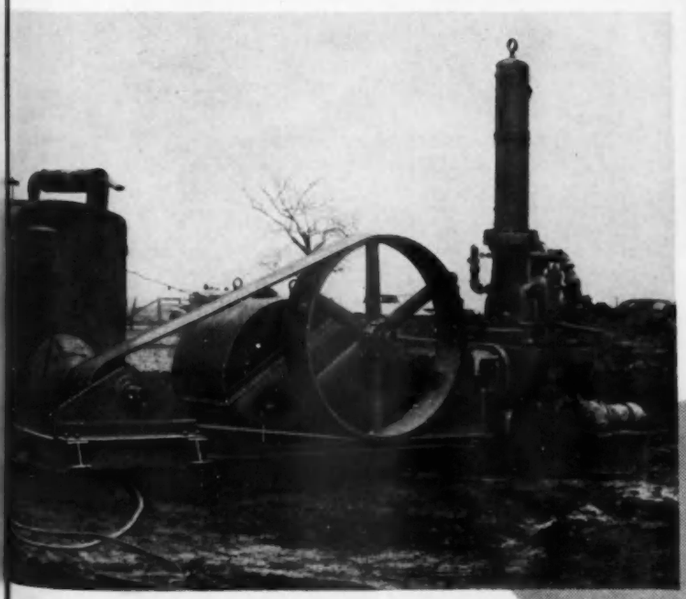

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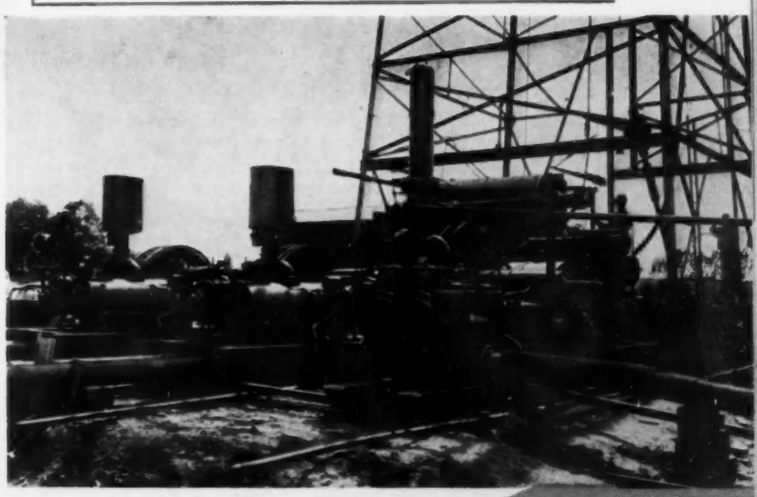
7¼ x 12	150	60 RPM
7¼ x 14	200	60 RPM
7¾ x 16	250	55 RPM
7¾ x 20	400	50 RPM



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dolomite can be calculated. The following equations give the results of such calculations:

$$(1)\quad \underset{73}{2HCl} + \underset{100}{CaCO_3} = \underset{111}{CaCl_2} + \underset{18}{H_2O} + \underset{44}{CO_2} + 8257 \text{ Btu}$$

$$(2)\quad \underset{146}{4HCl} + \underset{184.3}{CaMg(CO_3)_2} = \underset{111}{CaCl_2} + \underset{95.3}{MgCl_2} + \underset{36}{2H_2O} + \underset{88}{2CO_2} + 36388 \text{ Btu}$$

The first equation means that when 73 pounds of hydrogen chloride (54.4 gallons of 15 percent hydrochloric acid) react with 100 pounds of limestone, 8257 Btu of heat are generated. Thus $\frac{8257}{100}$, or 82.6, Btu of heat are generated for each pound of limestone dissolved; and $\frac{8257}{54.4}$, or 151.8, Btu are generated for each gallon of 15 percent hydrochloric acid which is neutralized.

Equation (2) above means that when 146 pounds of hydrogen chloride (108.8 gallons of 15 percent hydrochloric acid) react with 184.3 pounds of dolomite, 36388 Btu of heat are generated. Hence $\frac{36388}{184.3}$, or 197.5, Btu are generated for each pound of dolomite dissolved; and $\frac{36388}{108.8}$, or 334.4, Btu are generated for each gallon of 15 percent hydrochloric acid which is neutralized.

Equations (1) and (2) are applicable only when the reactions are carried out at low pressures and the carbon dioxide is evolved as a gas. If the reaction is carried out under considerable pressure as is nearly always the case in an acidizing treatment, a large part or all the carbon dioxide will be dissolved in the spent acid (see Figure 5). This solution of carbon dioxide in the spent acid liberates an additional quantity of heat, and under conditions of pressure where all the carbon dioxide is dissolved in the spent acid, the total heat evolved (that is, the heat of reaction as given in equations (1) and (2) plus the heat of solution of the carbon dioxide) is given in the following equations:

$$(3)\quad 2HCl + CaCo_3 = CaCl_2 + H_2O + CO_2 + 16{,}816 \text{ Btu}$$

$$(4)\quad 4HCl + CaMg(CO_3)_2 = CaCl_2 + MgCl_2 + 2H_2O + 2CO_2 + 53{,}507 \text{ Btu}$$

Equation (3) shows that when limestone reacts with hydrochloric acid under sufficient pressure that all the carbon dioxide is dissolved in the spent acid, 168.2 Btu are evolved when one pound of limestone is dissolved, and 309.1 Btu are evolved when one gallon of 15 percent hydrochloric acid is neutralized. Under similar conditions the reaction between hydrochloric acid and dolomite evolves 290.3 Btu per pound of dolomite dissolved and 491.8 Btu per gallon of 15 percent hydrochloric acid neutralized.

From the above discussion it is apparent that nearly twice as much heat is evolved when a pound of dolomite is dissolved as when a pound of limestone is dissolved and that in the case of limestone the total heat of the reaction is nearly doubled if the pressure is sufficient to dissolve all the carbon dioxide in solution while in the case of dolomite this difference is only about 50 percent.

Table 1 gives these various calculated heat values in tabular form and also shows what temperature rises in the formation could be expected from the liberation of this heat of reaction. The horizontal line marked "Temperature Rise in Spent Acid, °F." shows the amount that the spent acid would be heated if all of the heat of reaction were used to heat the spent acid. The bottom line in the table shows the amount that the spent acid and the formation immediately surrounding it would be heated assuming a uniform porosity of 15 percent. The figures in this bottom line may be considered as fairly representative of the temperature rise which would result from an actual well treatment.

Conditions Influencing Speed of Chemical Reaction

The speed of a chemical reaction can be defined as the time necessary to convert a given mass of reacting materials into new products. There are several factors which influence the speed of a chemical reaction. Among them are the nature of the reacting substances, the specific conditions existing when the reaction takes place such as the pressure and temperature, the concentration of the reacting substances, and the presence of other substances which speed up or retard the reaction.

The effect which the nature of the reacting sub-

THERMOCHEMICAL DATA	LIMESTONE		DOLOMITE	
	CO_2 LIBERATED AS GAS	CO_2 DISSOLVED IN SPENT ACID	CO_2 LIBERATED AS GAS	CO_2 DISSOLVED IN SPENT ACID
BTU PER POUND OF ROCK	82.6	168.2	197.5	290.3
BTU PER GALLON OF 15% HCL	151.8	309.1	334.4	491.8
TEMPERATURE RISE IN SPENT ACID °F.	20.1	41.0	44.6	65.5
TEMPERATURE RISE °F. IN SPENT ACID AND SURROUNDING ROCK ASSUMING 15% POROSITY	4.4	9.0	9.3	13.8

TABLE 1

In this table are listed the amounts of heat evolved by reaction of hydrochloric acid with limestone and dolomite, and also calculated temperature rises based on different assumed conditions.

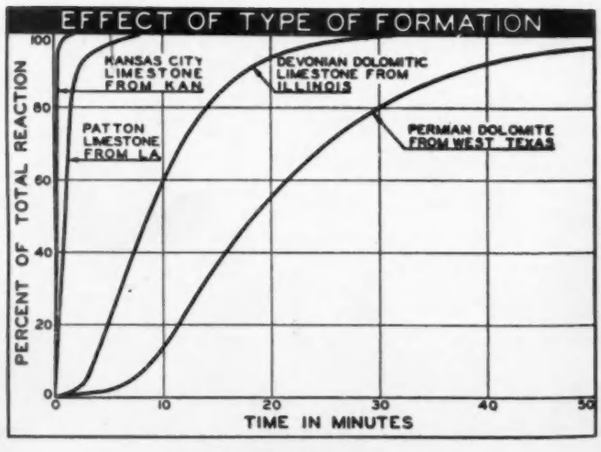


FIGURE 9

As shown by these curves, some formations react with hydrochloric acid at a much faster rate than others. Dolomitic formations usually require a much longer treating time than certain limestones.

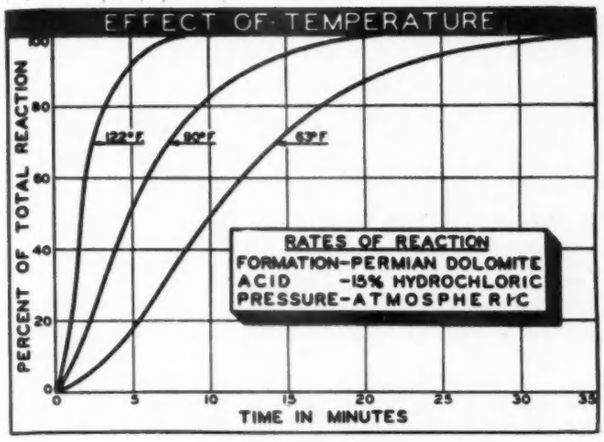


FIGURE 10

Temperature is one of the principal factors governing speed of a chemical reaction. In the particular series of tests graphed, the speed was about doubled by a temperature increase of 25° F.

stances has upon the speed is clearly demonstrated by Figure 9. The reaction rate of hydrochloric acid on certain limestone formations is very much faster than that between certain dolomitic formations and hydochloric acid. The data for these curves were obtained from experiments which were performed at atmospheric pressure and temperature.

In most chemical reactions, an increase in temperature will appreciably increase the speed at which the reaction proceeds. This increase in rate of reaction is primarily due to the increase in the velocity of the ever-moving molecules of the reacting substance, which enables more of the acid molecules to contact limestone molecules and react.

In Figure 10 are three curves which demonstrate the effect of temperature upon the rate of reaction. The data for these curves were obtained from laboratory tests in which samples of Permian dolomite were allowed to react with hydrochloric acid at various temperatures. It may be noted that the time required for the reaction to take place was decidedly reduced by an increase in temperature. These curves show that at atmospheric pressure a temperature rise of from 20 to 30 degrees Fahrenheit is required in order to double the speed of the reaction. This correlation holds only on reactions run at atmospheric pressure, for when pressure conditions are revised there are consequent changes in the increase in reaction rates due to temperature increase.

Chemical reactions such as that between hydrochloric acid and limestone are retarded when the pressure is increased. In any reaction in which there is a gaseous product formed, an increase in pressure slows down the rate of reaction. In the acidizing reaction previously discussed, any increase in pressure would tend to prevent the free evolution of carbon dioxide gas and thus to increase the concentration of carbon dioxide in the partially spent acid solution. Since the rate of reaction is directly proportional to the concentration of the reactants and inversely proportional to the concentration of the products of the reaction, an increase in carbon dioxide concentration would necessarily slow down the desired reaction.

A reaction of this type theoretically can be completely stopped by the application of enough pressure. Calculations show that it would take approximately 10^{10} atmospheres of pressure or approximately 147,000,000,000 pounds per square inch to completely stop this reaction. This figure is only approximate, as it is also dependent upon several other factors such as the temperature and the concentration of the acid.

The influence of pressure on this reaction can be shown by comparing the time required for the reaction under various pressures. In Figure 11 is a curve showing the time necessary to complete 50 percent of the reaction between dolomite and hydrochloric acid at pressures up to 3000 pounds per square inch. To obtain data for this curve, tests were conducted by placing 300 cc's of 15 percent hydrochloric acid and 10 grams of 10- to 20-mesh Permian dolomite in a specially constructed stainless steel bomb, which was so arranged that the dolomite was kept out of contact with the acid until the bomb was inverted. Before the reaction was started, oil was pumped into the bomb until the desired pressure was obtained, and then the bomb was inverted, which started the reaction. Acid samples were taken from the bomb at regular intervals during the reaction and these samples were analyzed to determine how

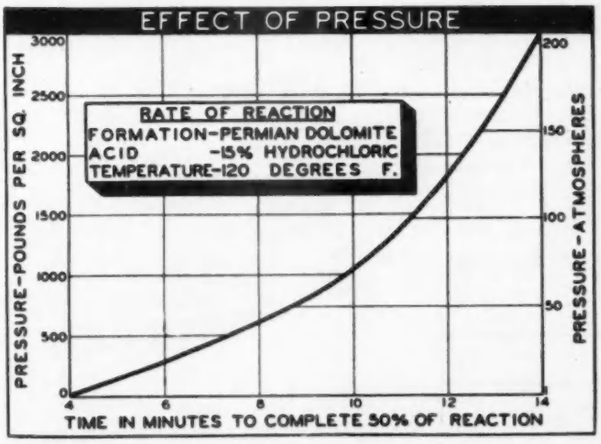


FIGURE 11

This curve shows that the action time increases with pressure increase, but that the influence of pressure upon the rate of reaction is less pronounced at extremely high pressures.

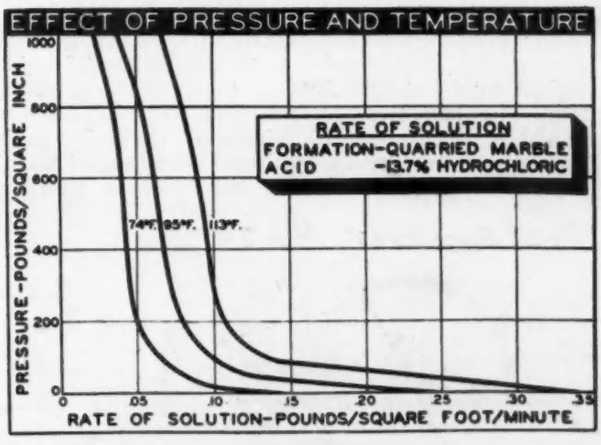


FIGURE 12

By means of a series of tests performed at three different temperatures, the influence of pressure upon the solution rate of a sample of quarried marble in limestone was determined.

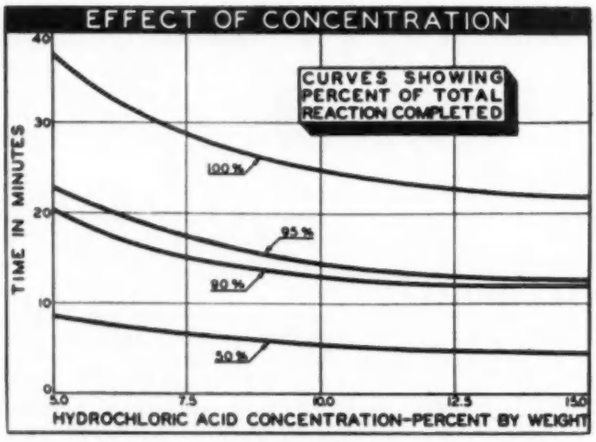


FIGURE 13

Dolomitic samples were allowed to react with an excess of acid, and the curves plotted above show that the reaction proceeded more rapidly at high acid concentrations.

much of the dolomite had been dissolved. The time necessary to dissolve 50 percent of the dolomite was thus obtained.

Figure 12 shows clearly the effects of both temperature and pressure upon the rate of reaction. The data for these curves was obtained in quite a different manner from that used on Figure 11. A sample of limestone from a quarry was used for these tests and the reaction rate was determined over a very short period of time. In each of the curves of Figure 12, the solution rate decreases very rapidly as the pressure increases, up to 100 pounds per square inch. From that point on, the rate decreases as the pressure increases, but the effect of pressure is lessened. The curves also show that the solution rate increases as the temperature increases. As might be anticipated, the rate of solution increase is about the same between the 74° Fahrenheit and the 95° curve, as it is between the 95° and 113° curves, for any constant pressure.

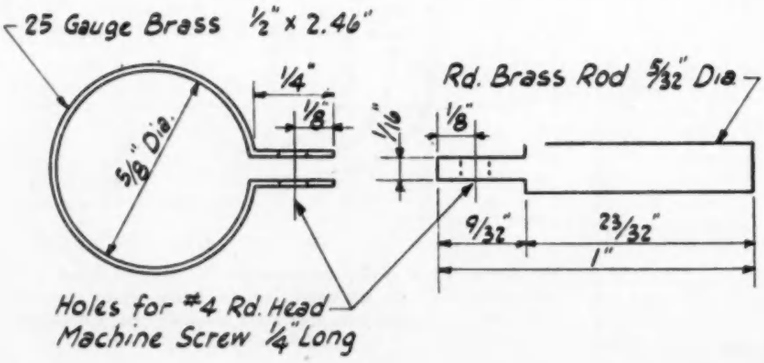
It is a well established chemical law that speed of a chemical reaction is proportional to the concentration of the reacting substances. This generality, however, holds only for a definite concentration range. Considered from a molecular standpoint, this influence of concentration is logical. When the concentration of a solution is increased the number of reacting particles is also increased, and, therefore, there is a greater probability of particles coming into contact with each other and reacting. Thus, the reaction will take place at a more rapid rate. Figure 13 shows that the speed of the reaction between dolomite and hydrochloric acid is almost directly proportional to the acid concentration.

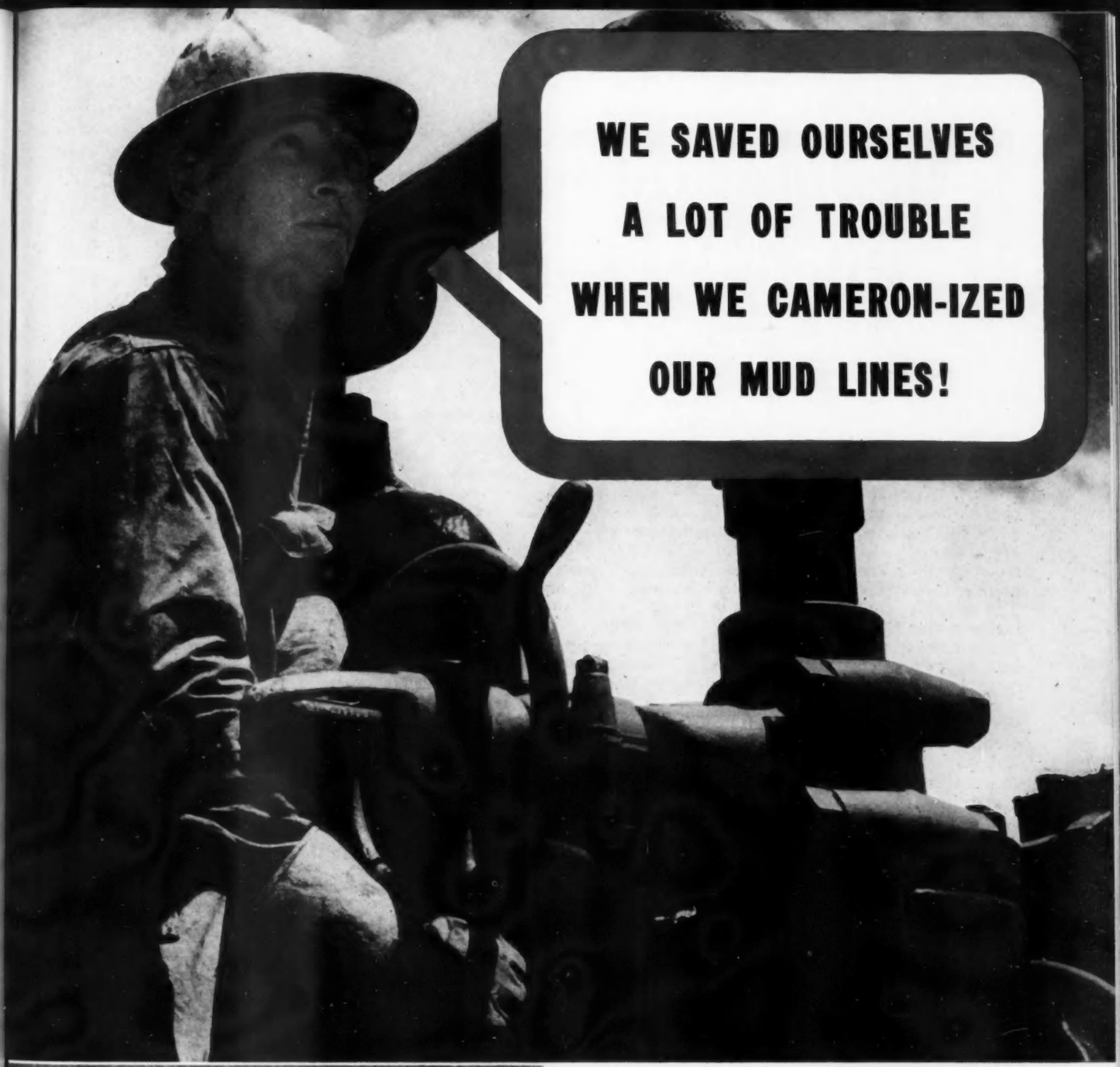
Although it is quite true, as stated above, that rate of reaction is directly proportional to the concentration, it is also true that as the concentration increases, the total time of reaction is lengthened. Based upon the fact that 5 percent acid has a slower reaction rate than 15 percent acid, the suggestion has been made that dilute acid be used as a retarded acid to slow down the reaction rate in those cases where a retarded acid is deemed advisable. This is fallacious reasoning, as the 15 percent acid has about three times the acid content of the 5 percent acid. Obviously, if 15 percent acid is put into a formation, it will react for a considerable time before its strength is reduced to 5 percent. After the 15 percent acid has been reduced in strength to 5 percent, it will still react for as long a time as would fresh 5 percent acid. Therefore, 15 percent acid will not be completely neutralized in as short a period of time as 5 percent acid, even though the reaction rate is faster.

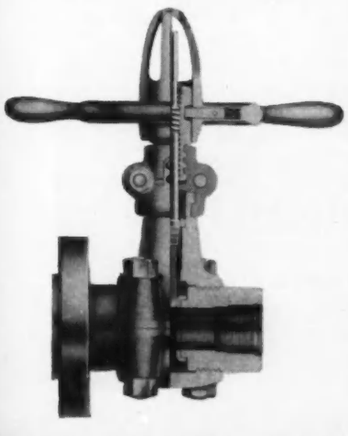
Microscope Light

IN the examination of drilling samples from wells at all hours of the day and night the writer tried various types of illumination; an ordinary flashlight held in the left hand; plug-in attachments to an automobile; an extension cord attached to the well's lighting system. The last two devices mentioned give excellent illumination but require considerable equipment and necessitate examining the samples in locations which are often times not particularly convenient.

After struggling with these devices an ordinary fountain pen type flashlight was purchased and attached to the microscope with rubber bands. This arrangement proved so convenient that a clamp was placed around the flashlight so that it could be permanently mounted on the microscope. The device has been subjected to a six month's service test and has worked well. The initial cost of the flashlight and clamp was $1.25, and the operating cost for batteries is about 10 cents an hour.







Cross-Section View of a Cameron Flex-Seal Mud Valve. Note that the body is made in two pieces to facilitate replacement of the flow-way insert. The two-piece body is held together by four studs and is sealed by lips made integral with the flow-way insert.

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The enclosure is made in four sections; two sides and two ends. The side sections are identical, and are made up with a continuous pipe bent at the upper corners and with extensions below the straight bottom rail to form lugs that are inserted in the 2-inch nipples. The lower rail is attached to the end sections of the main rail with clamps bolted to each piece. The fencing used is finished with smooth top and bottom edges which are attached to the rails with loops of wire and the ends are attached with wire wound in a spiral, beginning at the top and finishing at the bottom so that no sharp ends are exposed. One end of the guard is plain, finished in the same manner as the sides, but narrower, as the enclosure is in the shape of a rectangle. The opposite end, which is the end through which the jack pull rod extends, is made with top and side rails the same as used on the other end, but the lower rail is made with an inverted "U" so that the jack pull rod will have an opening. The pipe nipples in the concrete are sufficiently strong to support the fence, but the sides and ends are tied to each other with clamps near the top, using flat strips of mild steel and bolts for joining. Not only is the fence a safeguard against injuries to animals and people, but when painted the guard adds to the appearance of the properties.

Easily demountable pumping unit guard for wells in Salem oil field.

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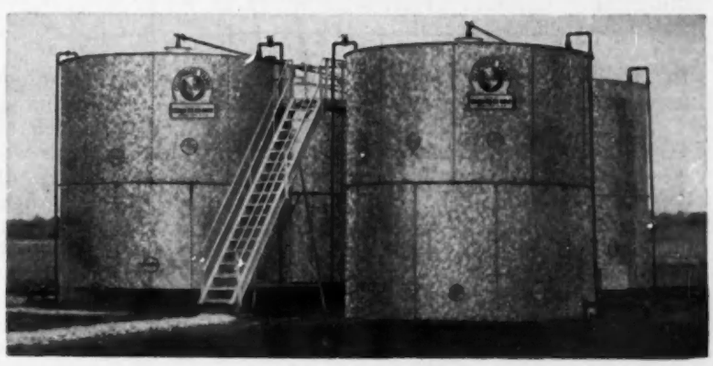

Outlook for Foreign Firms In Argentina Improves

By DR. WALTER P. SCHUCK
Buenos Aires, Argentina

THERE is growing evidence today that the sweep of expropriation and complete government ownership of oil in Argentina has not only been interrupted but is about to be reversed. Added to this improvement is the expanding opportunity for sale of refinery equipment for government refineries, while there seems not much more opportunity for privately operated refining operations.

In Argentina, railroads have recently revised time-tables primarily because of fuel shortage. Argentina's shortage of fuel is a serious handicap for the country's industrial development even under wartime conditions. With coal lacking and timber scarce, the solution is to either have enough oil or turn to burning grain, which is, of course, only an emergency measure when adopted.

For this reason, the position of foreign oil companies, menaced by the threat of expropriation against compensation in recent years, has improved. Now, should the revision of Bolivia's policy lead to an arrangement between the Bolivian State monopoly, Yacimientos Petroli-Fiscales Bolivianos (YPFB), and the Standard Oil Company, the policy of the Argentine YPF might be revised also.

Until recently, of course, the Argentine YPF has been doing its utmost to prevent private companies from securing concessions in the Republic and had succeeded in getting for itself a monopoly for drilling in national territories which cover 43.23 percent of Argentina.

In addition, the provinces of Buenos Aires, Entre Rios, and Santa Fe, which comprise 7.73 percent of Argentine territory have partially reserved a monopoly for themselves. The provinces of Mendoza, Santa Fe, San Juan, Cordoba, and San Luis, on the other hand granted the same type of monopoly to the Central Government through the YPF. This has left concessions open to be acquired by private companies in the following provinces:

Province	Sq. Km.
Jujuy	48,500
Tucuman	22,500
Catamarca	71,900
Santiago del Estero	135,300
La Rioja	92,300
Corrientes	89,400
Cordoba (part only)	70,400
Salta (part only)	106,000
Buenos Aires (part only)	285,756

This area open to private concession totals 922,056 square kilometers, or 32.95 percent of the total territory.

However, nationalism is strong here in Argentina and particularly strong in the field of refining. While total refined oil has not increased considerably, in the past two years, it is noteworthy that production from private companies is holding its own with the YPF output and is using a fairly stable total of imported petroleum. Import permits are available only for crude petroleum in addition to those issued for fuel oil, Diesel and gas oil. In the past two years refinery production has been as follows: In 1937, the YPF contributed 1,130,175 tons, compared with 1,453,457 tons from private companies of oil refined from Argentine petroleum and 785,190 tons from imported petroleum. In 1938 the YPF production was 1,581,469 tons and private production rose to 1,825,275 tons from Argentine petroleum and 783,769 tons came from imported.

Despite consequences of national refining, reflected in figures over a period of years, the nationalistic attitude toward refining is strong.

In a recent statement, the State Petroleum Company explained that refining possibilities in the Argentine Republic are sufficiently high to deal with the national production of crude oil. Nothing was said in the statement relative to possible consequences of import reductions by private companies. It is well known that, on the instigation of the Argentine government, private companies have replenished their stocks since the beginning of the current year.

At the time of the statement the YPF complained about lack of adequate transportation facilities especially from the new oil fields in the Province of Mendoza, and insisted upon urgent purchases of tank and railway cars in the United States.

While refining by private companies operating in Argentina follows the usual practice, State or YPF refineries are situated at La Plata in the Province of Buenos Aires; San Lorenzo, Province of Santa Fe; Plaza Huincul (Neuquen Territory), Godoy Cruz in Province of Mendoza; Vespucio in Province of Salta; and in addition there is the Campanas (Province of Buenos Aires) which has been bought from the Swiss-owned Cia Itaca, a subsidiary of the "Astra." The following details of production cover 1938 in cubic meters:

PLANT	Aviation Naphtha	Naphtha	Refin. Oil Tractor Fuel Gasoline	Fuel Oil Diesel	Lubr. Oil Greases Paraf.	Gas Fuel Heating Supergas	Dry Gas
La Plata	14,232	242,443	74,903	743,309	34,068	7,627	42,666
San Lorenzo	.....	126,431	24,841	203,104	.....	.....	11,857
Plaza Huincul	.....	4,358	1,525	112	.....	.....	.....
Vespucio	.....	2,904	1,600	4,914	.....	.....	.....
Godoy Cruz	.....	2,673	1,231	20,134	.....	.....	.....
Campana	.....	11,119	2,463	4,878	.....	.....	1,067

Latest addition to the refineries of the YPF was the San Lorenzo refinery which started work early in 1938 on the lines of the La Plata plant. The YPF has also bought an area of 1696 hectares in Lujan, a district of the Mendoza Province where another refinery is to be constructed. This plant will be supplied with crude from the new field near Tupungato in the same province.

HUNT *All-Steel* SAFETY POP VALVE

Approved by the National Board of Boiler and Pressure Vessels . . . and by the A.S.M.E.

DESIGNED and manufactured for steam pressures 50 to 500 pounds . . . for air and gas pressures 50 to 3,000 pounds. Nickel steel body; bronze cap, lever and adjustment screws; Cast S-Monel valve and seat; 18-8 stainless steel valve stem; special heat resisting steel spring chrome plated for further resistance to corrosion . . . these fine materials double the life of this valve in contrast to the very short life of conventional pop valves for oil field service. Each valve is individually tested by our own high pressure testing boiler capable of checking pressures to 500 pounds steam . . . a system not available in other plants specializing in oil field work.

Furnished on an economical exchange basis in either flanged or screwed types, 2-inch size, through your local supply store.

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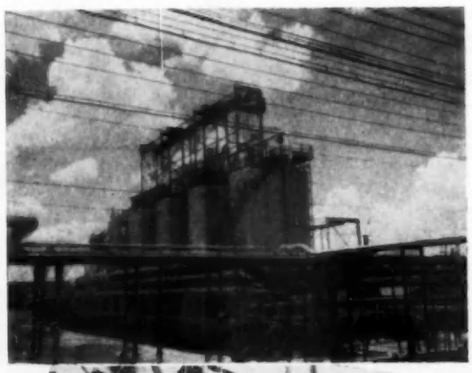

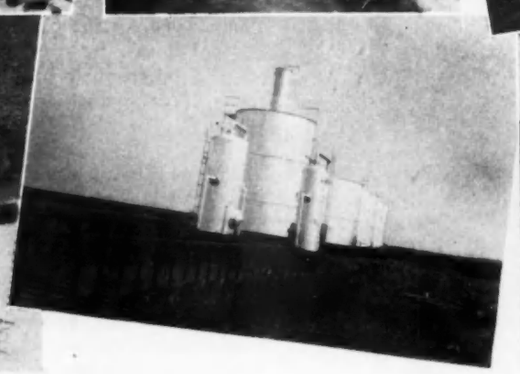

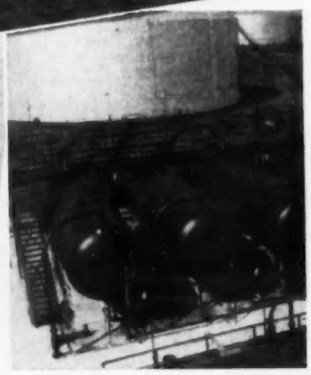

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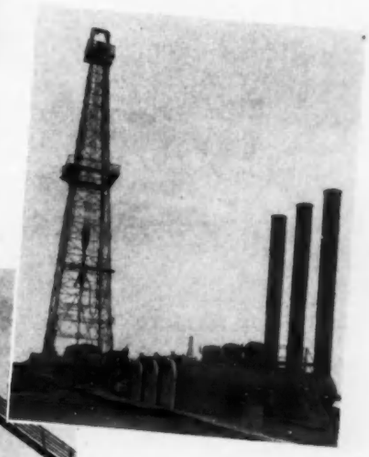
-BAN★

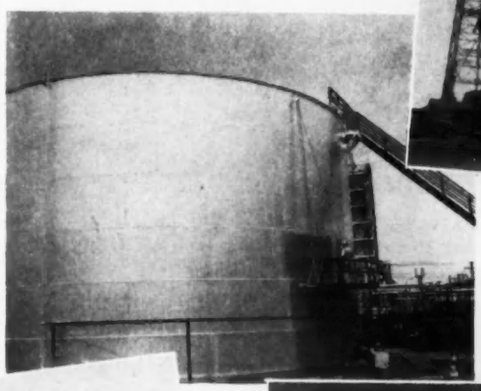
PROTECTS

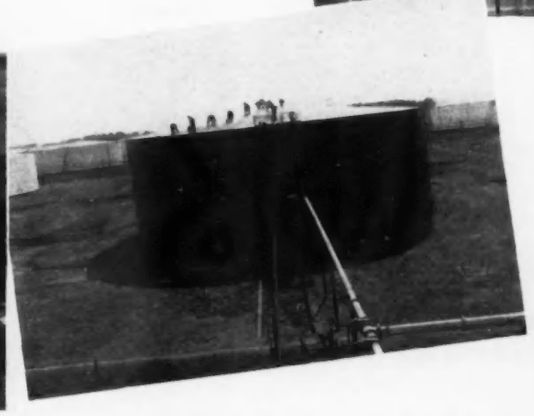
the oil industry's equipment against corrosion

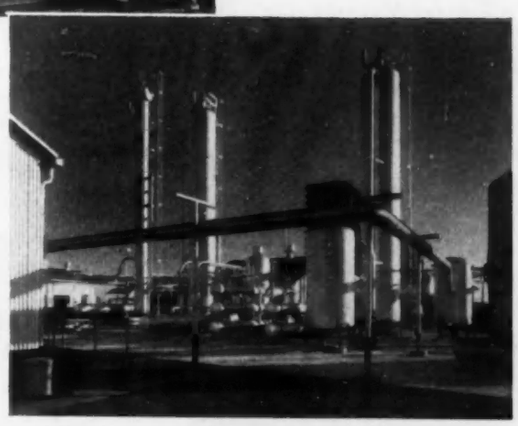


Rust-Ban is not a single product, but a complete line of corrosion preventives. The Rust-Ban products have proved their worth under the varied operating conditions encountered in oil fields, in refineries and on miles of pipe lines.

Learn how Rust-Ban can assist you in the solution of your corrosion problems. Write the nearest marketer.







of Louisiana, **New Orleans, La. • In Texas by *Humble Oil & Refining Company,* Houston, Texas • In Oklahoma and Kansas and parts of Missouri by *The Carter Oil Company,* Tulsa, Oklahoma • In Kentucky, Georgia, Florida, Alabama and Mississippi by *Standard Oil Company (Ky.),* Louisville, Kentucky • In other states by *Penola Inc.,* Pittsburgh, Pa. • In Canada by *Imperial Oil Ltd.,* Toronto, Canada.**

DRILLING CONTRACTORS' NOTEBOOK

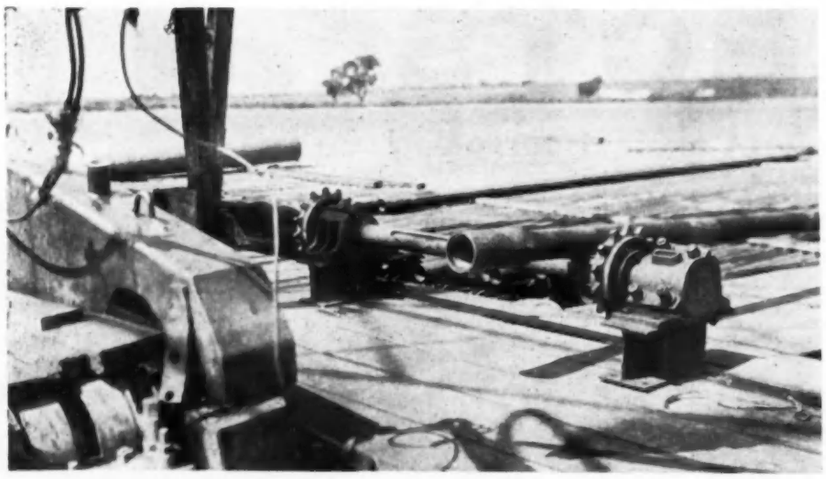
Helpful Suggestions For Those Interested In Drilling Methods

Operating Ideas Maintenance Hints New Rig Hook-ups

Published as a regular feature of THE OIL WEEKLY

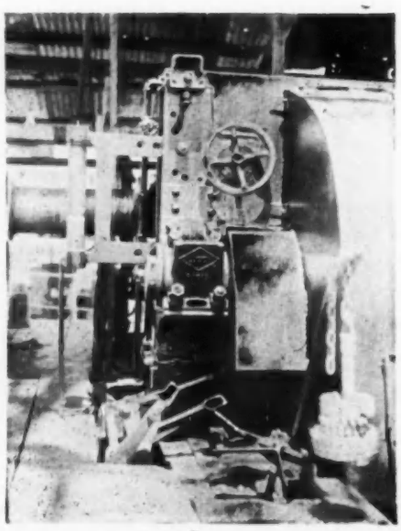
1. PIPE HANDLING

Rat-Hole Digger Gives Additional Service as Drill-Pipe Carrier



This rat-hole digger serves as a roller for incoming drill pipe and provides the necessary lift for attaching the elevator or other type of lifting grip.

A RAT-HOLE digger serves a double function at Pace Drilling Company's rig in the Cement field of Caddo County, Oklahoma.



This control switch at the driller's stand stops the rig in an emergency.

Once the rat hole has been completed, this piece of equipment is normally stored until the rig is moved to a new location. This unit was found to make an excellent drill-pipe carrier, replacing a wooden block. Its weight is sufficient to eliminate bolting to the derrick floor.

2. SAFETY

Master Switch Gives Driller Control

AN automatic control switch mounted on the upper left wing of the drawworks has proved itself one of the most important safety features on the Diesel-electric rig of Ray Stephens, Inc., operating in the Cement field of Caddo County, Oklahoma.

Two wires coming from the lower end of the box are connected to an electric panel directly at the rear of the drawworks. Should any mishap occur while drilling, coming in or out of the hole, or while making drill-pipe connections, the entire mechanism may be stopped by the driller by pushing the control button.

When drilling is to be resumed, the throttle is reversed.

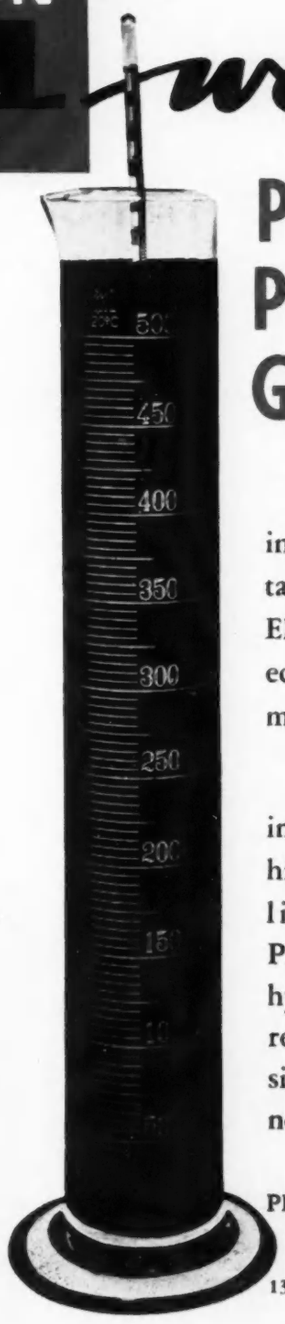
3. RIGGING UP

Extra Rope Stored Under Derrick

LENGTHS of soft-rope and cat-line rope used on some deep drilling rigs in California fields receive extremely hard wear, and very frequently require replacing within a minute's notice when a heavy or

Soft rope and cat-line rope may be safely stored below the derrick floor.

PETRECO *ELECTROMATIC* DEHYDRATION *of* ALL *wet crude*



PROFITABLY PREVENTS GRAVITY LOSSES

The potential selling price of crude oil usually increases in direct ratio to its true gravity. Maintaining the gravities of crudes by the Petreco Electromatic Dehydration Process is an established economy practice of leading production departments.

It is generally accepted that even crudes testing within pipe line requirements may command higher prices by proper dehydrating and handling. The PETRECO ELECTROMATIC PROCESS is the obvious method for proper dehydrating. Petreco engineers, backed by complete research facilities, are eminently qualified to assist you. Your inquiries are solicited, and there is no charge or obligation involved.

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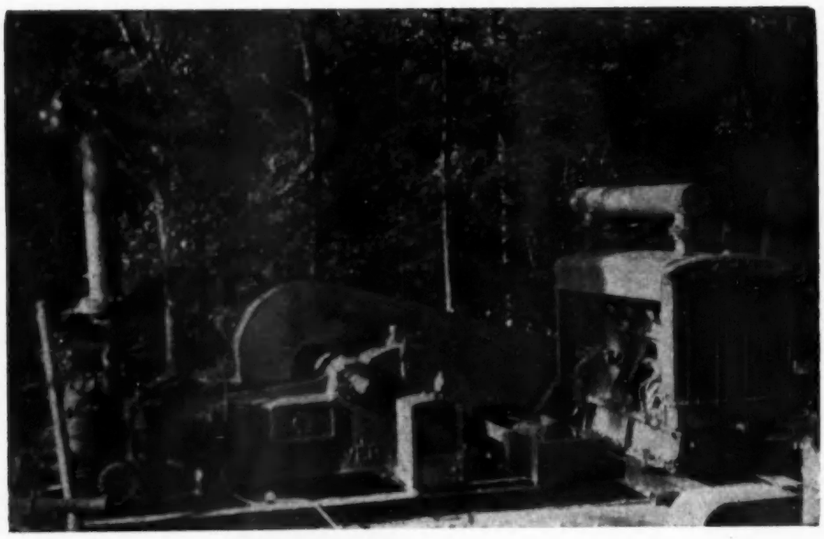
PETRECO

DEHYDRATING **DE-SALTING**

dangerous operation is in progress. One operator solves this problem by keeping his new rope coils stored below one of the drier corners of the draw-works house, running the loose ends up through holes in the floor.

New rope is stored on a small platform of 2-inch planking raised several inches off the ground, kept dry and free from unexpected mud or oil splashes. During rainy weather, two or three pieces of corrugated iron are stacked around it. A loose knot or hitch on the end above the floor keeps the end handy and ready for instant use, and at the same time makes it possible to quickly pull out any desired length without tangling the coils.



A short section of 10-inch pipe serves as a muffler for this multi-cylinder engine.

4. ENGINE CARE

Ten-Inch Pipe Used for Muffler

TO dampen the sharp bark of a multi-cylinder engine pulling the mud pump, a short section of 10-inch pipe may be used as a muffler. The pipe should be closed at each end with a flat welded head, with short nipples attached to one side with half of a bolted flange so that the muffler can be attached to the twin exhaust stacks on the engine. With the top of the stacks threaded to receive the other half of the bolted flange, attaching is a simple matter. Slots at convenient points are cut in the muffler, and holes are punched in the end farthest away from the rig to allow the expanded gases to escape.

This support for the measuring-line reel is sturdy, yet is easily moved.

5. GADGETS

Portable Stand for Measuring Line

AN easily moved support for a frequently used measuring line reel may be made by welding a rectangular base of 1-inch pipe, mounting the reel on a stand so that it extends over the base. The stand may be toe-nailed to the floor of the derrick at any convenient place, and taken up easily with a crow bar.

6. MUD HANDLING

Advantages in Flume Made of Pipe

CARRYING the returning mud stream through a flume of 16-inch pipe instead of the usual timber structure provides a natural washway which prevents the formation of dikes which eventually give way and may vary mud composition sufficiently to temporarily upset well balance

By removing sections of the upper portion of the pipe with a cutting torch, visible control of mud conditions may be maintained, while covers slightly larger than the excised sections may be utilized to prevent rain-water dilution of

Flume of 16-inch pipe with cut-out sections permits inspection of mud.

CHESTER

Oil Country Tubular Goods for more than 41 years

Heavy timber bulkhead, facing ends of boiler blow-off lines, prevents accidents from steam flow or material blown across lease by high-pressure water or steam.

the mud when close control is required.

Heavy handles welded at intervals along the flume assist in moving or erecting it.

7. SAFETY

Planking Encloses Blow-Off Lines

WHERE drilling is under way in open fields in which stock is pastured, extra precautions must be taken to prevent injury to stock, with consequent damage suits. One company floors the blow-off space with heavy planking, erecting a heavy bulkhead to stop the steam travel and direct it upward.

Use of the planked area and bulkhead prevents soaking the ground in front of the boiler settings, permitting trucks to be moved directly to the units for loading when changing locations.

This counterweight arrangement eliminates a possible source of injury.

8. SAFETY

Method of Handling Counterweights

TO prevent injury to workmen on the derrick floor from a descending tong counterweight, a California operator provides a steel container for the counterweight to drop into.

A light-weight steel cylinder, a discarded tank or a separator with the top removed is securely bolted to one of the girt braces in the corner of the derrick. Its diameter is usually about twice that of the counterweight.

To further insure smooth, safe action, two 4-inch sections of 3-inch pipe are welded to the back of the counterweight and made to slide on a vertical length of 2-inch pipe bolted to the inside of the cylinder on the lower end and U-bolted to one of the girts at the upper end.

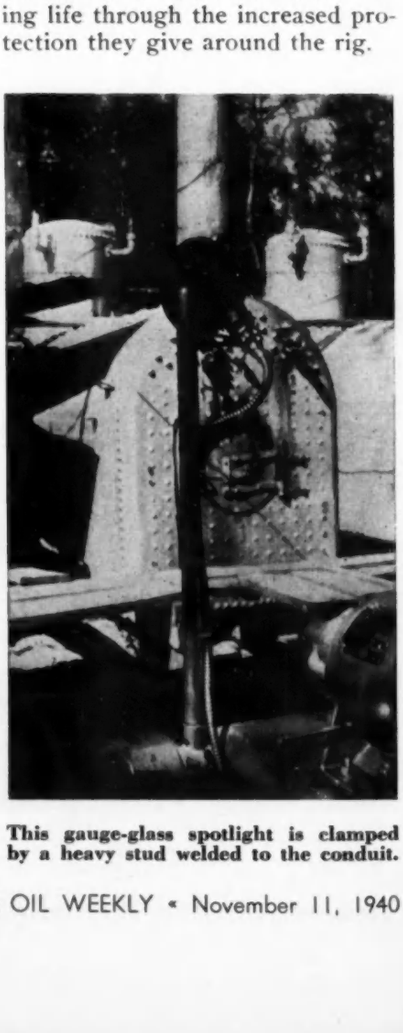
9. LIGHTING

Rigid Support for Gauge Light

SPOTLIGHTING the boiler gauge glasses with units mounted on the front of the feed-water pump skid, accurate setting of the light is secured by welding a one-inch stud to a tee in the conduit on which the light fixture is mounted. The stud carries a lock nut, and is screwed into a similar nut welded to the side of the standard serving as light support. By loosening the lock nut, the light can be swivelled around its support on the post, and the desired illumination spotted on the gauge.

Use of hooded, parabolic reflectors on these lights prevents glare from the units creating a hazard around the pump, and enables the driller to locate and communicate with the fireman from the derrick floor.

Conduits, used to carry all lighting circuits, add to initial cost, but reduce fire hazard and extend wiring life through the increased protection they give around the rig.



This gauge-glass spotlight is clamped by a heavy stud welded to the conduit.

HIGHLIGHTS IN THE WEEK'S NEWS

Washington

Ickes Makes Customary Offer of Resignation

Harold L. Ickes, Secretary of the Interior, last week submitted his resignation to give President Roosevelt a free hand should he desire to make a change in his cabinet. Ickes took the same course following the president's re-election in 1936.

"I, for one, believe the president should be left free at the beginning of a new administration to reshuffle, recreate or do anything he pleases with his official family, especially in view of the mighty task ahead of him," Ickes said.

May Ask Further Oil Taxes for Defense

Further increases in Federal taxes on petroleum products may be asked of Congress within the next few weeks by the Treasury Department as part of its plans for financing the national defense program for the next 19½ months.

Results of the election paving the way for long-time planning, Secretary Morgenthau on November 7 disclosed that he will ask Congress for sharply boosted taxes, immediate elimination of tax exemptions for federal, state and local bond issues, and an increase of from $11,000,000,000 to $16,000,000,000 in the national debt limit.

These steps, he explained, will be necessary to finance government activities and the rearmament program up to June 30, 1942. What may be needed beyond that date, he refused to predict.

Already the treasury is within $500,000,000 of the $45,000,000,000 current limit of the national debt, and Morgenthau is anxious that Congress cut the strings on the $4,000,000,000 which earlier this year it authorized the treasury to borrow for defense purposes, so as to make the money available for general use of the government.

The treasury head gave no indication of the extent of the new taxes which he will ask, nor where they will be applied, but it is generally expected in Washington that he will ask for increases in existing levies because of the increasing difficulty of finding new sources of revenue. Efforts by Congress to develop such sources when it was considering the tax bill earlier this year brought forth none of any moment.

Possibilities that the oil industry might be called upon for a further contribution were seen by observers in Washington, who pointed out that gasoline has proven to be a fertile field of revenue for both the federal and state governments.

Under the one-cent-a-gallon tax, the federal government collected over $226,000,000 during the fiscal year which ended June 30, last, and will collect well over $100,000,000 additional this year through the increase of ½-cent a gallon imposed in the defense-tax bill.

Although it is admitted gasoline now is heavily taxed, in some states the combined taxes being close to the cost of the gasoline itself, it is believed the Administration may take the position that in a defense effort the country must stand for hardships, and that another ½-cent may be added to the federal levy.

Collections from lubricating oil, which amounted to $31,232,000 for the last fiscal year, also will be heavier this year as a result of the defense levy, but it is questionable whether the rate will be further increased because of the comparatively small amount which it returns.

Crude Price Average $1.02 in 1939, Bureau Reports

"Although widespread price breaks were imminent on several occasions in 1939, most postings remained virtually unchanged throughout the year," the United States Bureau of Mines stated last week in its final review of the oil industry in 1939. "However, most reductions of October, 1938, were in force for the entire year, hence the average value per barrel declined from $1.13 in 1938 to $1.02 in 1939. Pennsylvania Grade prices were again the most active and several increases raised the average about 20 cents per barrel in 1939 over 1938."

Drilling declined during the year and the number of oil wells brought in dropped from 19,121 in 1938 to 17,485 last year, it was reported. However, in spite of the lower average value, the number of abandonments was much less than in 1938, with the result that the number of producing oil wells increased about 11,000 to a total of 380,390 on December 31, 1939.

News Index

General:

Allowables	59
Associations	59
Washington	59
Pipe Lines	62
World Wide Developments	66
Markets-Statistics	68
Men in News	111

U. S. Field Operations:

Arkansas	95
California	96
Completions	98
East Texas	86
Forest City Basin	80
Illinois	75
Indiana	75
Kansas	78
Kentucky	75
Louisiana Coast	92
Michigan	96
Mississippi	95
North Louisiana	92
North Texas	82
Oklahoma	76
Rocky Mountain Area	95
Southeastern States	95
Southwest Texas	86
Texas Gulf Coast	90
West Texas	84
Wildcat Development	106

Allowables

Texas Orders Seven Shut-In Days During November

The Texas Railroad Commission issued orders, effective November 4, closing down most Texas oil fields for seven days during November. The reduction effected by this cut was estimated at 100,000 barrels, and commission officials thought the allowable would average approximately 1,324,000 barrels daily during the remainder of the month. Fields will be closed down on November 9, 10, 16, 17, 24, 28 and 30.

Apparently Commissioners Sadler and Thompson, who signed the order, had concluded that mounting storage and approaching winter would result in accumulation of too much oil, unless a cut was ordered. November 2 the commission had provided for increases in two Gulf Coast fields, Thompson and Webster, but Thompson explained that these increases were in the nature of an adjustment.

Neither Thompson nor Sadler had any explanation other than that storage was increasing, and, as the order stated, "waste was imminent." Thompson said that he favored no further changes prior to the statewide hearing, which is scheduled for November 18. He thought that the fields and the state as a whole are as nearly in balance as could be accomplished.

The following fields were exempt from the shutdown orders for the remainder of November: Luling Branyon, Salt Flat, Mission River, Plummer, Bammel, Barbers Hill, Boling, Esperson Dome, Goose Creek, High Island, Old and New Hull, Humble, Livingstone, Mykawa, New Mykawa, Sandy Point, West Columbia New, Louise, Damon Mound, Charamousca, Moca, Sinton, Mexia, Powell, Wortham, Boggy Creek, Grapeland, Lonestar, Rotan, Big Lake, Hendricks, Howard-Glasscock, Iatan East Howard, Taylor Link, and Johnson (Cooke County).

Associations

Organize Recycling Group At Kingsville, Texas

The American Recycling Association was formed in Kingsville, Texas, November 5, during a program held at the Texas College of Arts & Industries. Its activities will center around to production and manufacturing methods in condensate fields of South Texas.

Officials are E. E. DeBack, Corpus Christi Corporation, Corpus Christi, president; O. L. Roberts, Atlantic Refining Company, Philadelphia, vice president, and R. L. Peurifoy, Texas College of Arts and Industries, Kingsville, secretary-treasurer.

Directors are E. V. Foran, Foran, Knode, Boatright & Dixon, Houston; E. O. Bennett, Continental Oil Company, Ponca City; W. H. Vaughn, Tide Water Associated Oil Company, Palestine; Clyde Alexander, Corpus Christi Corporation, Corpus Christi; Henry N. Wade, Parkhill-Wade, Los Angeles;

Judson Swearingen, University of Texas, Austin; F. V. L. Patton, Railroad Commission of Texas, Austin; R. C. Alden, Phillips Petroleum Company, Bartlesville; W. F. Fulton, United Gas Company, Shreveport, and S. E. Buckley, Humble Oil & Refining Company, Houston,

The organization proposes to hold an annual meeting devoted to natural gas and condensate recovery. The faculty of the Texas College of Arts & Industries has offered to conduct a short course of several weeks each year should it be desired by men who are dealing with problems of condensate fields.

The technical program of the first meeting dealt with production methods and process of manufacture. Papers presented were:

"Methods of Condensate Recovery," by Wade, read by DeBack.

"Prediction of Subsurface Flows," by Foran.

"Deviation of Natural Gas from Boyle's Law," by Dr. George Granger Brown, University of Michigan, read by Dr. Munroe Kriegel, Texas College of Arts and Industries.

"Physical Properties of Hydrocarbon Mixtures in Condensate Mixtures," by Dr. F. H. Dotterweich, Texas College of Arts & Industries and Patton.

"Operation of the Podbielniak Apparatus," by Walter J. Podbielniak, Chicago, read by Herbert Kaiser.

"Gas Hydrates," by Roberts.

Frank Hudson Heads Pacific Coast Geologists

Four hundred members and guests attended the seventeenth annual meeting of the Pacific Section, American Association of Petroleum Geologists, held last week in Los Angeles. The meeting heard an address by Dr. L. C. Snider, New York, national president, and 13 technical papers and topical discussions were presented during the two-day session.

Dr. Frank Hudson, chief geologist, Shell Oil Company, was elected president and E. J. Bartosh, Bankline Oil Company, was re-elected secretary and treasurer. Albert Gregersen, past president, and the newly elected officers will comprise the section's executive committee.

Coincident with the meeting, the Pacific Section of the Society of Economic Palentologists and Mineralogists held its annual dinner meeting with J. M. Hamill presiding. Roy M. Barnes, Continental Oil Company, discussed "Exploration Activities and Results in California," illustrating his paper with slides.

Frank B. Tolman, Richfield Oil Corporation, was chosen president of the Pacific Section of the Society of Economic Paleontologists and Mineralogists for the ensuing year and T. W. Rothwell, Jr., of Richfield Oil Corporation, secretary-treasurer.

Abstracts of papers presented follow:

Quantitative Introduction to Gravity Prospecting

By Frederick Romberg
Geophysical Service, Inc.

Author discussed from illustrations geologic interpretation of gravity-meter data. Principles involved and operation of a gravity meter were detailed and a comparison drawn between a gravity meter and torsion balance. Various gravity meter elements were also considered.

Late Miocene and Pliocene Stratigraphy and Paleontology of the Santa Maria District, California

By W. P. Woodring
United States Geological Survey
and
M. N. Bramlette
University of California

Authors presented a progress report on project work now being completed covering late Miocene and Pliocene stratigraphy and paleontology of the Santa Maria district, using maps and charts to show results of the studies.

Thrust Faulting and Coarse Clastics in Temblor Range, California

By F. S. Hudson
and
G. H. White
Shell Oil Company

In the region of Recruit Pass, the Temblor Range consists of Miocene strata overlain by pre-Cretaceous crystalline rocks and Oligocene and Upper Miocene sediments of the Recruit Pass thrust sheet.

This thrust cover was folded with the underlying strata, though in somewhat lesser degree. The Recruit Pass fault on the southwest flank of the range dips southwest toward, and in places is seen to be cut by, a northwest-trending vertical fault. This is believed to be the northeasternmost element of the San Andreas Rift Zone, a strip two miles wide covered by faulted Pliocene, bounded on the southwest by the line of recent activity that is generally called *the rift*. The crystalline rocks are not native to Temblor Range but were thrust over it from a source either within, or to the southwest of, the Rift Zone.

The major movement on Recruit Pass fault was certainly pre-Quarternary and perhaps as early as late Miocene. It is suggested that movement began during Santa Margarita (Upper Miocene) and that the materials of the fanglomerate lenses in Santa Margarita shale found on the northeast flank of the range came from the crystalline rocks which were thrust into the area tributary to the basin of shale deposition.

The Estimation by Volumetric Methods of Recoverable Oil and Gas from Sands

By John F. Dodge
University of Southern California
and
Howard C. Pyle
and
Everett G. Trostel
Union Oil Company of California

The classical formula for volumetric estimates involving factors for area, sand thickness, porosity, saturation and recovery is reviewed and the need for modification and amplification of the factors demonstrated. Individual factors are redefined in their new content and methods for their evaluation outlined. The need for consideration of both physical and economic effects in the choice of a recovery factor is emphasized. Recovery factors for oils are distinguished from those for gases for co-occurring and produced oil and gas mixtures. Applicability of volumetric reserve estimates to engineering appraisals is discussed and inherent limitations of the procedure set forth.

In conclusion the authors point out that practical accuracy in volumetric estimates of oil and gas reserves is dependent both upon the accuracy and completeness of the data available and upon the skill and resourcefulness of the engineer and geologist in analyzing and visualizing reservoir conditions and fitting together the fragmentary data into a compatible whole. Similarities with, and differences from, other fields within his experience should be recognized as well as the practical limitations of the factors involved, their relative importance and relative weight.

The Accumulation of Marine Diatomaceous Sediments

By Richard W. Fleming
and
M. C. Sargent
The Scripps Institution of Oceanography

Discussion of the oceanographic aspects of diatomaceous deposits with emphasis on the conditions favoring the production of large numbers of diatoms in the surface layers of the water, as well as some of the factors which may affect the deposition and preservation of their skeletal remains.

The Role of Foraminifera in the Oil Industry

By Herschel L. Driver
Standard Oil Company of California

Data derived from foraminiferal investigations have been applied during the past 18 years as an aid in the solution of economic problems. Foraminifera and other organisms are used along with texture, hardness and color of rocks, fluid and mineral content, electric logs and geophysical data as a means of correlation. Fossils supply the sole practical means of determining the age of rocks. Micropaleontology laboratories deal with about 15,000 to a small fraction of that number of samples per month, resulting in marked variations in personnel, technique and results.

Interpretation and Application of Electric Logs

By R. W. Norton
Standard Oil Company of California

The author presented a brief description of the resisitivity and self-potential curves, explaining the various measurements which are made with electrical logging instruments. The application of these measurements to geological correlations and interpretation of formation content was discussed at length.

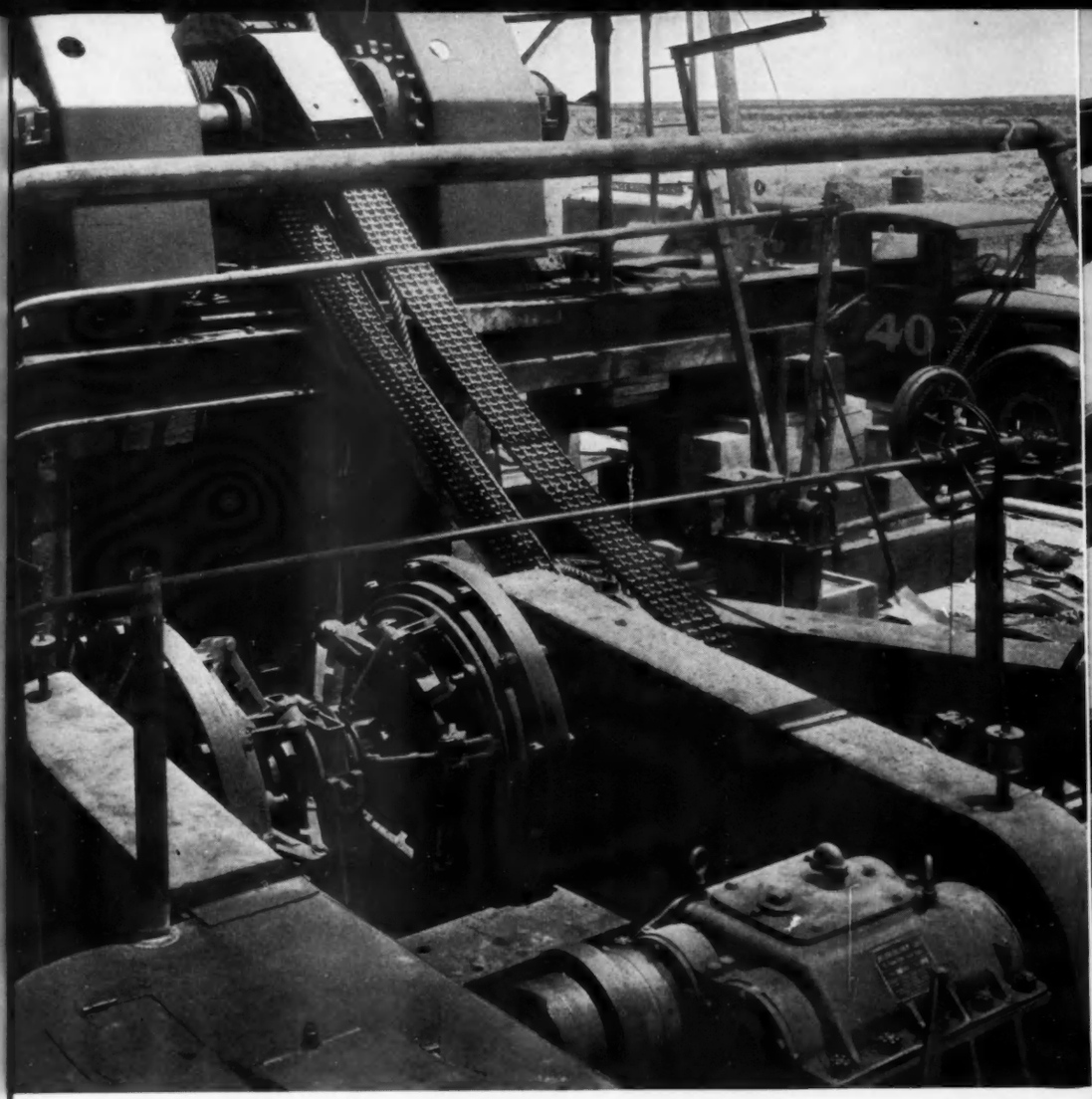
Geology and Gas Potentialities of Marysville Buttes

By Harry R. Johnson
Consultant

Marysville Buttes, a strikingly isolated, nearly circular topographic feature about 10 miles in diameter, rises nearly midway across the Sacramento Valley, from a marginal elevation of less than 100 feet above sea level to over 2000 feet in its craggy central portion.

Geologically, the Buttes are believed unique as far as California is concerned: successive volcanic and deformational episodes have greatly disturbed Cretaceous, Eocene, Pliocene, and possibly even younger sediments in a broad peripheral zone, the outer margin of which is hidden beneath a thick mantle of volcanic ejecta originating at a central crater developed during the final phase of activity.

Gas in commercial amounts has already been developed on the south side of the Buttes in sands of Cretaceous age, and evidence indicates other favorable structural traps for gas and possibly for oil elsewhere within the marginal area of the uplift. Field studies during the past summer have thrown new light upon the Cretaceous—Eocene relationships and upon



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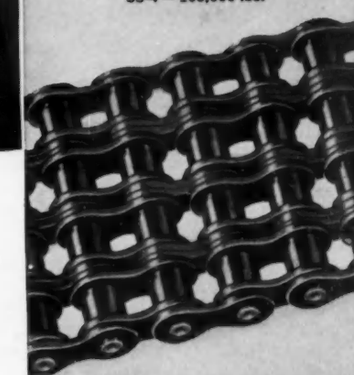

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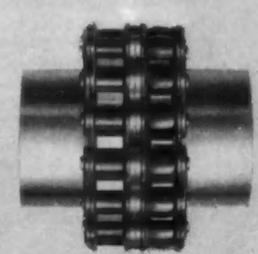

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Recently Discovered Deep Miocene Production in the Inglewood Oil Field

By A. F. Woodward
Stanley & Stolz

Miocene production has been extensively developed in almost every field in the Los Angeles Basin. The fact that the Inglewood oil field was one of the principal exceptions prompted the drilling of Sentous Number 1 on the south flank of Inglewood fold by the R. R. Bush Oil Company.

The Sentous test found the top of the Miocene at about 7350 feet, and productive sands between 8325 and 8757 feet. The Pliocene section was normal, but thicker than expected. The Upper Miocene sediments consisted principally of Nodular shale, siltstone, and fine grained silty sandstone, with some altered tuff beds and volcanic material between 8350 and 8425 feet. Production is coming from the lower part of Upper Puente (Upper Miocene).

Seismic Velocity Variations in the San Joaquin Valley

By W. S. Olson
The Texas Company

Velocity data have been obtained in approximately 80 wells in the San Joaquin Valley largely due to the efforts of the Cooperative Well Velocity Surveying Group, organized in July, 1938. Analysis of this data has revealed the existence of rapid lateral changes in velocity which fit into a regional pattern. The causes of the variations are discussed by the author and also their effect on seismic reflection mapping.

Some methods for correcting reflection survey data are considered. The author presented more than 20 slides furnished by Cecil H. Green, with well data from E. H. Vallat.

The Stevens Sand, Southern San Joaquin Valley, California

By Rollin Eckis
Richfield Oil Corporation

The Stevens sand, first penetrated in 1936 by the Shell Oil Company's discovery well at Ten Sections oil field, is present beneath a large part of the southern San Joaquin Valley in Kern County. It has a maximum known thickness in excess of 2000 feet, and at present is yielding commercial production from seven different structures.

It comprises the series of sands penetrated by wells in the southern part of the San Joaquin Valley, that lies below the top of a prominent cherty brown shale zone within the upper Miocene.

The author discusses primarily the distribution, character and probable origin of the sand body.

Ecologic Factors in Correlation

By J. E. Eaton

The fact that migrating and recurring ecologic environments cause many correlations based on fossil faunas and floras to reflect homotaxial rather than time equivalencies has long been recognized. The principle involved has been applied, however, chiefly where marked differences in latitude, different provinces, or other obvious relations are apparent. There has been a tendency to tacitly imply, or to even state, that ecology can be more or less safely ignored when comparing similar faunas within a province or part of a province.

Recent research on the environments of Miocene faunas, including a unique evolutionary record of the extremely short-ranged and precise astrodapses, suggests that ecologic factors cannot be ignored even over short distances without incurring the risk of serious errors in correlation. In the Miocene of California, certain previously accepted molluscan correlations between southern and northern basins of the state are now indicated to be erroneous by as much as one natural stage. Certain previously accepted foraminiferal correlations between southern and northern basins are now indicated to be erroneous by as much as one third of the epoch. More locally, changes in fauna due to ecology which could cause errors approximately as large have been noted in tracing a horizon three or four miles basinward from an ancient strand.

Migration, with time, of relevant temperatures and hence of certain faunal environments, from north to south and from open waters toward the strand, appears to have been the chief cause of mistaking homotaxial for time equivalencies in these Miocene correlations. Data thus far secured rather closely corroborate pioneer work by Natland.

The problem of avoiding errors arising from homotaxis is an almost infinitely vast and complicated one, because nearly all standards for comparison are relative. As a beginning, more emphasis might be placed on those supposed index fossils of relatively short range, and less on assemblages of long-range forms. More effort might be made to split species into varieties having differing ranges. In particular, it is suggested that the policy be adopted of always mentioning ecologic factors, even if only to state that such factors are presumably present but cannot be evaluated.

Illinois Mineral Industries Conference November 14-15

A mineral Industries Conference has been announced for November 14-15 by the Illinois Geological Survey, the Engineering Experiment Station of the University of Illinois, and the Illinois Mineral Industries Commission, to be held in Urbana-Champaign. The event will include dedication of a new Natural Resources Building on the University of Illinois campus.

The meeting will begin with an open-house gathering on the morning of November 14 to afford an opportunity for complete inspection of new offices and laboratories of the survey. An all-mineral-industries luncheon at noon will be followed by concurrent separate sessions on oil and gas, coal, clay and clay products, rock and rock products, and a symposium on the geology of the Devonian system conducted jointly with the department of geology of the university.

A general mineral industries banquet will be held Thursday evening.

Dr. Isaiah Bowman, president of John Hopkins University, will give the address on the afternoon of November 15 during dedication ceremonies of the Natural Resources Building.

Ample quarters have been provided in the new building for filing of well logs, for study of cuttings and cores, drafting of log-strips and maps, preparation of reports, and handling of interviews and correspondence. Provided are fully equipped laboratories for analysis of oil, gas and brines, and for determination of porosity, permeability and saturation of oil sands.

Oklahoma Mineral Industries Conference November 19

The Mineral Industries Committee of the Oklahoma Development Council and the Oklahoma Geological Survey have announced a Mineral Industries Conference to be held on the University of Oklahoma campus, Norman, November 19.

Purpose of the conference is to bring together representatives of the various mineral industries of Oklahoma for the exchange of interests, problems and ideas; to establish better contact between the Oklahoma Geological Survey and the industries it is maintained to serve, and to acquaint men in those industries with the information and facilities available at the survey for their benefit.

The program will be devoted to a discussion of problems of mineral industries, the work of the survey, some of its results, and the relation of minerals to national defense.

Speakers will include Governor Leon C. Phillips; S. M. Shelton, supervising engineer, Mississippi Valley Experiment Station of the United States Bureau of Mines; Dr. H. A. Buehler, Missouri state geologist, and Dr. Charles N. Gould, former director of the Oklahoma Geological Survey.

The meetings will begin at 10 a.m., and will end with a dinner commencing at 6 p.m., at which time Phillips and Shelton will speak. Arrangements are in charge of Robert H. Dott, director of the Oklahoma Geological Survey, Norman.

Pipe Lines

Stanolind to Recondition 169-Mile North Texas Line

Stanolind Pipe Line Company will recondition its multiple pipe line system, extending from Mexia via Graford junction to Bowie station, North Texas, involving 169 miles of 8-inch and 75 miles of 10-inch pipe. The system was acquired from Sinclair Pipe Line Company. The Mexia-Graford unit, consisting of combination 10- and 8-inch threaded pipe was built in the early 'twenties, and 60 miles of 8-inch loops were added in 1928, while at the same time a parallel 8-inch welded line was built north from Graford into Oklahoma. One of the latter units has handled West Texas crude the past decade. The Mexia-Graford section has been out of commission about 5 years. Stanolind Pipe Line Company has recruited 3 crews to complete the reconditioning work by February 1, 1941. The project will cost about $300,000.

Magnolia Awards Contract For 50-Mile Gravity Line

Gravity flow will be utilized by Magnolia Pipe Line Company in operation of its projected trunk line from the Duggan-Slaughter district, most northerly producing area in West Texas. Williams Brothers Corporation was given contract to start construction this week, and work is to be completed by January 1. The line will consist of 50.7 miles of 8-inch extending from the field tank farm site, Labor 21, League 51, Scurry County School Lands, Southwestern Hockley County, thence south

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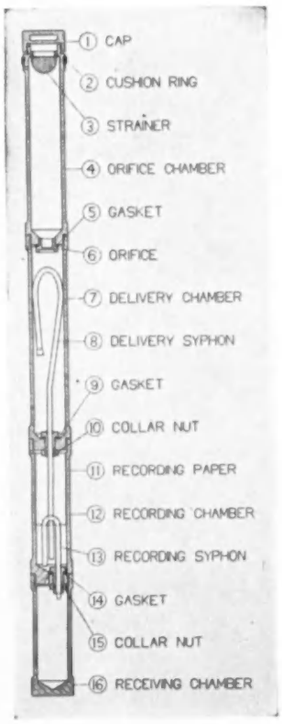

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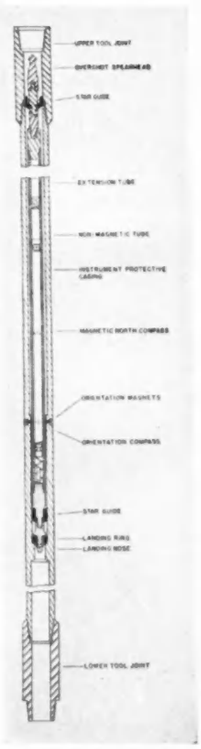

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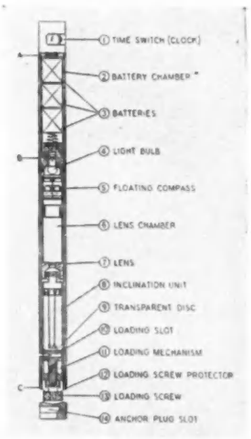

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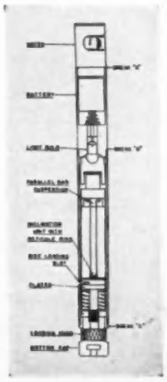

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to the company's Seminole field station and tank farm, involving a 250-foot fall. This unit is scheduled to handle 6000 barrels of oil daily.

The company's 26-mile 8-inch, extending south from Seminole to Andrews County, where deliveries are currently being made to Atlantic Pipe Line Company's Hobbs-Midland carrier, will be tied into Magnolia Pipe Line Company's Midland terminal by laying 39 miles of 8-inch welded line.

The Duggan-Slaughter gathering system will embrace 5 miles of 8-inch; 4 miles of 6-inch, and 8 miles of 4-inch, extending north thence northwest and west thence north from the field terminal. Deep cuts will be made through narrow ridges that would otherwise prevent gathering the oil by gravity. Two 10,000-barrel receiving tanks will be erected at the head of the trunk line. A 67,000-barrel tank will be added to the storage facilities on hand at the Seminole station.

Magnolia Completes 42-Mile Hull-Silk Pipe-Line Outlet

Magnolia Pipe Line Company placed in operation last mid-week a supplemental trunk line outlet from the Hull-Silk field, North Texas, to Ringgold station on its Oklahoma-Beaumont system, involving 42 miles of 8-inch discharge line and 15 miles of 4- and 6-inch gathering lines. A booster station has been erected on the north end of the field. This new unit affords the company a total capacity of 30,000 barrels daily out of the district, and eliminates the necessity of pumping crude runs from the Hull-Silk field via the K-M-A field to Electra in reaching the company's original 8-inch carrier, which has been in operation since 1911.

Stanolind Pipe Line Company began work last week laying 2½ miles of 4-inch line from its Nocona deep pool, Montague County, booster station to the Benton pool on the east side of Nocona townsite. It will serve the Stanolind Oil & Gas Company's single producer. The discovery well is connected to Sinclair Refining Company's line.

Start 15-Mile Michigan Natural Gas Pipe Line

Gas Corporation of Michigan has started construction of 15 miles of 4-inch pipe line from Clare to the Lake George gas field. Shamrock Pipe Line Company has the construction contract.

Gas Corporation of Michigan services Clare, Rosebush and Mt. Pleasant with natural gas.

Fort Worth-Oklahoma City Gasoline Line Completed

Magnolia Petroleum Company has completed construction work on its 187-mile 4½-inch welded refined oil products pipe line, extending from its Fort Worth refinery to Oklahoma City. Operation of this interstate carrier will be deferred until completion of a refinery expansion program next spring.

Revise Dyersdale Rule

The Texas Railroad Commission has amended its rules for the Dyersdale field, Harris County, requiring only 300 feet of surface casing, instead of 1000 feet, as provided in the original rule.

World-Wide Developments

Route Foreign Crude for Canada Through United States

Standard Oil Company (New Jersey) last week confirmed reports that it is arranging for movement in bond of South American oil from Marcus Hook, near Philadelphia, via pipe line through Port Huron, Michigan, to Sarnia, Canada.

Heretofore, it has not been practicable to supply crude oil directly from affiliates of Imperial Oil Company in South America to its refinery at Sarnia. Instead, these oils had first to be run at Imperial Oil Company's refinery at Montreal, and only part of the products were then transported by tanker via the St. Lawrence River and Great Lakes to its Sarnia refinery. The recent discontinuance of Illinois crude oil movement by pipe line to the Atlantic Seaboard has made the lines available for direct movement in bond to Sarnia with equal economy to Imperial Oil Company. It is contemplated that about 10,000 barrels per day will be moved in this way.

The route will be as follows: The oil will be unloaded at Sun Oil Company's terminal at Marcus Hook and moved through the Susquehanna and National Transit pipe lines to Colegrove, Pennsylvania, then west through the northern system to the Pennsylvania state line and on through the Buckeye system to Cygnet, Ohio. Here it will be pumped through the Transit & Storage line to the International boundary at Sarnia, Canada. Part of the pipe lines comprising this system would be idle unless utilized in this bonded movement from Marcus Hook to Sarnia.

Italy Reported Desperately in Need of Petroleum

Well informed circles in Rome, particularly those familiar with the Italian oil industry, say Italy's need for oil today is desperate, more urgent by far than that of her Axis partner, Germany, which entered the war vastly better prepared both in reserves and in facilities for producing synthetic oil, according to Spencer Williams, Columbia Broadcasting Company correspondent just returned to New York from the Balkans.

Williams said that Mussolini, convinced that Britain's collapse would be only a matter of a few weeks after the capitulation of France, threw Italy into the war with a supply of petroleum equivalent to only four months normal peace-time requirements. He continued with the explanation that Italy is cut off from all sources of supply today except the oil coming from Rumania, about 56 carloads per week, destined for the refinery at Trieste. This would allow the refinery to turn out about 800 tons of petroleum products per week, about enough, according to Williams, for the operation of one battleship. [More recently, Rumania has stopped all Black Sea shipments, according to press dispatches from Bucharest.]

"The refinery at Bari on the Adriatic Coast (of Italy) is receiving crude oil from Albania," Williams said. "This crude is of low quality with a high sulphur content, and the amount realized in processing is neither large nor of good quality. The Venice plant is operating at a greatly reduced schedule. Three other plants, including those at Leghorn and Spezzia, are virtually shut down.

"This illustrates Italy's desperate need to get through to additional sources of oil in the Near East and accounts for the relative inactivity of Italy's vaunted air force and submarine fleet as well as other naval units," Williams added.

Mene Grande Completes Leona 1 in Venezuela

Mene Grande Oil Company has completed its Leona 1, 35 kilometers east of the company's camp at San Tome in Eastern Venezuela, making around 1000 barrels of 26-gravity oil at 7300 feet. The well is in the vicinity of the company's El Tigre well but is on a different structure. Mene Grande's concession covers the entire structure at Leona, which is a large one.

Alberta Operators Drill 617 Miles of Hole

Alberta oil companies drilled 617 miles of hole up to the end of August, 1940, or approximately the distance between Calgary, Alberta, and the Manitoba border, according to figures compiled by the Petroleum & Natural Gas Division of the Alberta Department of Lands & Mines.

Total footage from the opening of the century to the end of August, 1940, was 3,258,966 feet. In 1940, up to the end of August, 253,000 feet of hole were drilled in the province, including 213,511 feet in Turner Valley. During the corresponding period in 1939, a total of 278,612 feet was drilled in Alberta.

During the eight-month period of 1940, a total of 5,199,335 barrels of oil was produced, with a total valuation of $6,415,293.

Exempt Talco and Sulphur Bluff Fields From Shutdowns

The Texas Railroad Commission has issued an order, effective November 7, exempting Talco and Sulphur Bluff fields from shutdowns. This action was taken in response to a telegram from Talco Pipe Line Company stating that it had a demand for the oil.

The telegram asserted that with 30 days production, the company could gather 325,000 barrels, and meet demand, but that it would be 79,000 barrels short if the fields were required to comply with the shutdowns.

New Rules for Dugan And Slaughter Fields

Uniform operating rules for the Slaughter and Duggan fields, issued by the Texas Railroad Commission, provide for 35.4-acre proration units, and allow wells to be drilled 440 feet from lease lines and 880 feet apart.

Proration is on acreage and potential, with 50 percent allocated on each factor. A maximum gas/oil ratio of 2000/1 is provided, as well as annual bottom-hole pressure surveys.

Another order provides for new potential tests for all wells in the Duggan field, to be completed before November 20 and applied in proration schedules effective December 1.

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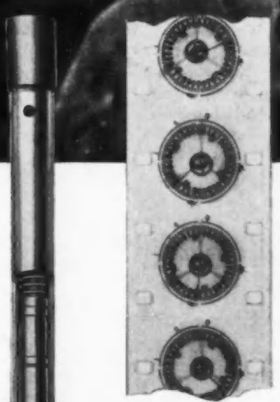

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More Moderate Operations Improve Oil Situation

Somewhat encouraging were figures on the industry's operations in the week ended November 2, both crude production and refinery runs having shown decreases, while another reduction was made in gasoline stocks. Storage of light fuel oil began to diminish seasonally as cooler weather stimulated demand. Heavy fuel oils also came out of storage as the nation's industrial activity proceeded at an exceptionally high level.

United States crude oil production was down sharply to 3,479,950 barrels daily in the week of November 2 from 3,640,300 the week before, according to the American Petroleum Institute, and at the new rate was about 100,000 barrels under market demand as estimated by the United States Bureau of Mines. However, the sharp decline reflected a temporary situation in Texas, where fields were shut down an extra day. That state was due to show a compensating increase in the week ending November 9, with only a normal number of shutdown days falling within the week.

Crude runs to stills were brought down to 3,535,000 barrels daily in the November 2 week from 3,565,000 the week before, and were 21,000 barrels smaller than in the corresponding week last year.

Production of gasoline totaled 11,808,000 barrels in the new period, against 11,243,000 barrels in the preceding 7 days. It was threatened, therefore, that withdrawals of gasoline from storage might be arrested in the week of November 9.

However, 117,000 barrels of gasoline came out of storage in the November 2 week, stocks having decreased to 80,774,000 barrels. That quantity was 9.8 percent larger than the 73,550,000 barrels on hand at the corresponding time last year.

Gas oil and distillate fuel storage was lowered 278,000 barrels in the week ended November 2, having come down to 48,615,000 barrels from the all-time peak of 48,893,000 barrels reached in the previous week. The inventory of light fuel oil is regarded as quite satisfactory, being nearly 9,000,000 barrels larger than a year ago.

Stocks of residual fuel oil were drawn upon to the extent of 276,000 barrels in the week of November 2, the American Petroleum Institute reported, having come down to 108,199,000 barrels, with industrial operations of the nation making heavy demands on supplies. The inventory of the heavy fuel oils is 5 percent, or 5,500,000 barrels, smaller than at this time last year.

Refinable crude oil in storage in the United States totaled 262,746,000 barrels on October 26, the bureau reported. That was 14 percent more than the 230,453,000 barrels on hand a year previously, when stocks were near the lowest level since 1922 because of the half-month shutdowns of Mid-Continent oil fields in August and the subsequent strict curtailment of production.

Products Except Gasoline Steady; Tanker Rates Rise

The industry's markets remained generally steady last week, and there were comparatively few changes in prices of either crude oil or refined products.

The only revision of crude postings was a 6-cent increase in Michigan. Sohio Corporation, subsidiary of Standard Oil Company of Ohio, effective November 1 increased its posting for Bloomingdale-Columbia (Van Buren County) crude from $1.12 to $1.18 a barrel. The posting had been unchanged since September 3 last, when a 4-cent increase was made. Sohio's advance of November 1 was followed by the other two leading buyers in the field. Naph-Sol Pipe Line and Erie Corporation.

The advance brought the Bloomingdale grade, 1200-foot Traverse oil, up to par with Allegan-Grand Rapids prices, set at $1.18 on August 24 this year.

The 6-cent advance was not expected to reflect beyond the district in which it was posted. Premium offers to gain connections to replenish declining production from other fields was reported the cause of the advance. The area runs from 100,000 to 130,000 barrels per month.

In other sections of the country, no revisions of crude prices were in immediate prospect, although Texas markets had been in jeopardy before the Texas Railroad Commission on November 4 ordered cancellation of shut-down exemptions in all but 36 of the fields of that state. The action was expected to result in reduction of Texas crude production to less than the current market demand as estimated by the U. S. Bureau of Mines. The tightening up of the curtailment naturally had a strengthening effect on the state's crude market.

Burning oils continued stronger than other products, with brisk seasonal demand causing further edging upward of quotations. In the Chicago area, tank-car quotations on No. 1 fuel oil were advanced ⅛- to ¼-cent a gallon by some sellers. On the Atlantic coast, some suppliers raised their quotations as much as ¼- or ⅜-cent a gallon on No. 2 and No. 3 oils. In Michigan, No. 1 fuel oil was reported to be comparatively scarce. The cooler weather was being reflected late in the week in the burning oil markets throughout a large part of northern United States.

Heavy fuel oils also were in good demand, and some marketers expressed the opinion that prices were due to advance soon. With industrial production of the country running at record levels and likely to continue so, it is indicated that exceptionally large quantities of industrial-grade fuel oils will be required in coming months. And stocks of those oils are quite moderate, being about 5,500,000 barrels smaller than at at this time last year.

Gasoline has continued in the role of a drag on the industry's markets. Stocks remain materially excessive, and demand is seasonally retarded. Consequently, prices have remained unsteady, although most refiners and marketers during the

Trends of Operations and Changes in Stocks

Figures are from American Petroleum Institute weekly reports, except those on crude stocks, which are from Bureau of Mines weekly reports

WEEK ENDED	Crude Oil Production (Barrels Daily)	Crude Runs to Stills (Barrels Daily)	Crude Oil Stocks (Barrels)	Gasoline Stocks (Barrels)	FUEL OIL STOCKS	
					Gas Oil & Dist. Fuels	Residual Fuel Oil
1938:						
November 12	3,243,250	3,180,000	273,394,000	[6]67,551,000	34,175,000	120,491,000
December 10	3,245,100	3,150,000	[6]269,509,000	68,687,000	32,068,000	118,711,000
1939:						
April 22	3,526,700	3,280,000	277,156,000	[2]87,769,000	21,085,000	105,035,000
April 29	3,568,200	3,405,000	278,440,000	86,794,000	[7]25,844,000	[7]108,409,000
May 6	3,580,900	3,275,000	[2]278,607,000	86,216,000	26,167,000	108,597,000
July 29	3,539,100	3,460,000	268,513,000	77,887,000	34,900,000	114,053,000
August 5	[1]3,909,400	3,445,000	268,982,000	76,431,000	35,601,000	114,512,000
August 26	[8]1,690,800	3,475,000	246,982,000	73,475,000	37,722,000	116,237,000
September 30	3,658,200	3,560,000	233,023,000	71,168,000	38,081,000	115,466,000
October 7	3,435,850	3,505,000	231,564,000	[6]71,152,000	38,549,000	114,397,000
October 21	3,771,550	[2]3,650,000	[3]229,127,000	72,122,000	39,358,000	115,060,000
October 28	3,498,500	3,520,000	230,453,000	72,660,000	39,562,000	114,786,000
November 25	3,818,100	3,510,000	231,811,000	75,595,000	38,527,000	112,106,000
December 30	3,545,000	3,445,000	237,742,000	80,985,000	34,184,000	106,680,000
1940:						
January 27	3,611,600	3,470,000	237,339,000	87,914,000	27,407,000	103,015,000
February 24	3,732,100	3,490,000	240,836,000	96,719,000	25,390,000	103,419,000
March 30	3,841,250	3,585,000	250,561,000	101,370,000	23,778,000	105,081,000
April 20	3,858,550	3,535,000	254,881,000	[1]102,817,000	24,779,000	103,323,000
April 27	3,845,250	3,555,000	256,670,000	102,452,000	24,997,000	102,552,000
May 25	3,835,650	3,580,000	259,330,000	100,297,000	28,356,000	104,015,000
June 22	3,846,450	[1]3,690,000	260,891,000	97,276,000	32,751,000	104,683,000
June 29	3,639,550	3,625,000	262,059,000	95,142,000	33,590,000	104,486,000
July 27	3,690,400	3,555,000	262,579,000	90,173,000	38,981,000	105,924,000
August 31	3,501,350	3,575,000	265,865,000	85,393,000	44,766,000	108,774,000
September 28	3,799,950	3,600,000	263,609,000	82,373,000	47,986,000	108,450,000
October 5	3,488,800	3,555,000	263,551,000	82,256,000	48,187,000	107,964,000
October 12	3,641,550	3,555,000	261,511,000	81,927,000	48,743,000	108,449,000
October 19	3,667,550	3,525,000	262,098,000	81,656,000	48,841,000	108,141,000
October 26	3,640,300	3,565,000	262,746,000	80,891,000	[1]48,893,000	108,475,000
November 2, 1940	3,479,950	3,535,000	.....	80,774,000	48,615,000	108,199,000
November 2, 1939	3,501,350	3,556,000	[4]230,453,000	73,550,000	39,946,000	113,749,000
Change in past year	—0.6%	—0.6%	+14.0%	+9.8%	+21.7%	—4.9%

[1] All time peak. [2] Peak for year. [3] Lowest since April, 1922. [4] Stocks, October 28, 1939.
[5] Lowest since October, 1922, due to shutdown of six Mid-Continent States. [6] Lowest for year.
[7] Prior to April 29, 1939, data did not include stocks at terminals, in transit, etc., except in California.
[8] October, 1939, daily average.

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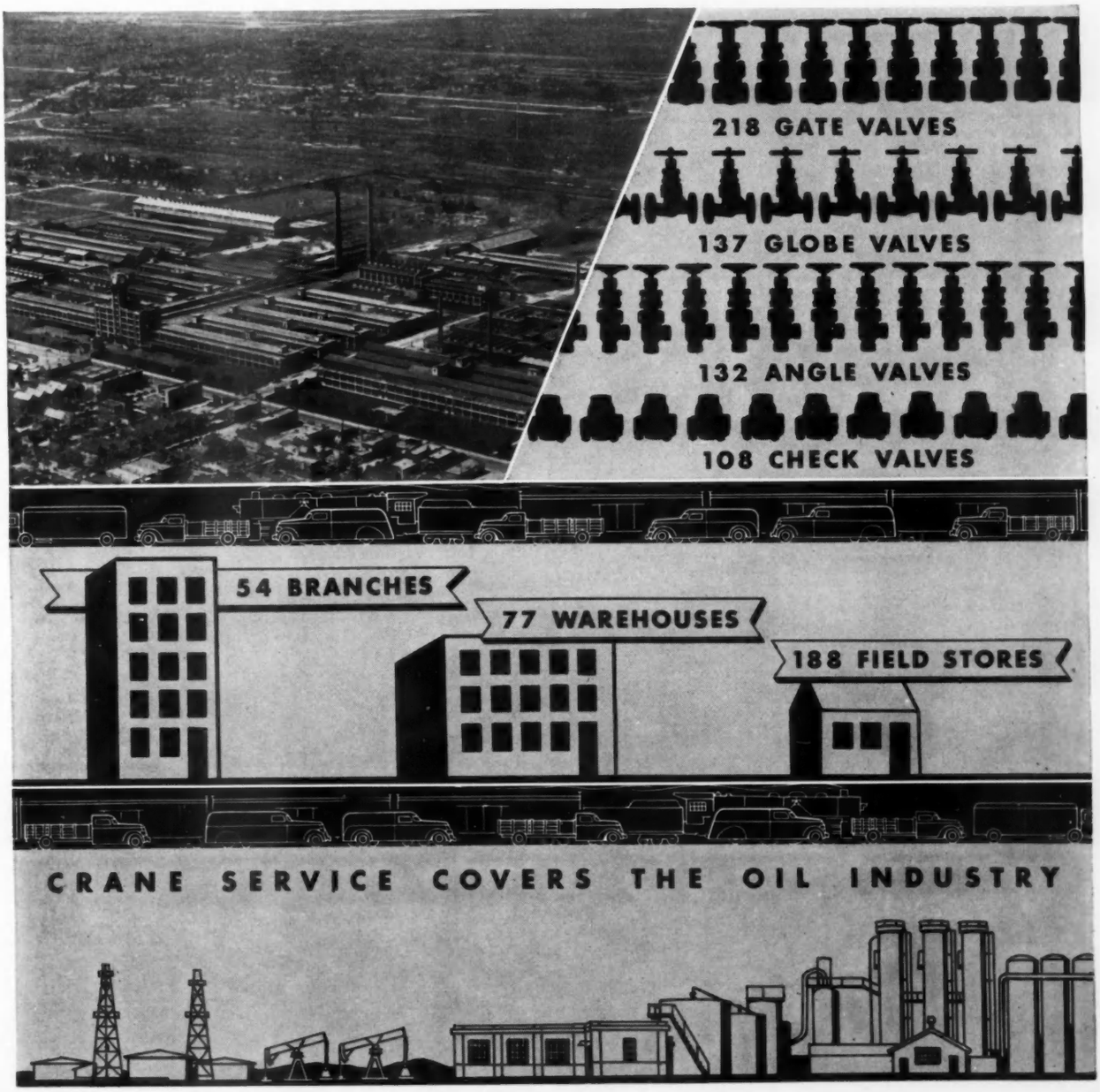

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NATION-WIDE SERVICE THROUGH BRANCHES AND WHOLESALERS IN ALL MARKETS

past week maintained former quotations.

Lubricants are in fair demand, as good domestic business is helping to compensate for the loss of much of the export market. However, no improvement in prices has occurred.

The steady advance of tanker rates between the Gulf Coast and the Atlantic seaboard has continued, and still higher rates are expected. Clean boats were last chartered at 40 cents a barrel for gasoline, 42½ cents for kerosene, and 45 cents for No. 2 fuel oil. Dirty boats, meanwhile, brought 38 cents for 30-gravity or lighter crude and 43 cents for 10-20-gravity fuel oil.

Production Unexpectedly Rises In August, Bureau Reports

Running contrary to forecasts, crude petroleum production in September increased by nearly 80,000 barrels a day over the August output to reach a daily total of 3,644,600 barrels, it was reported November 6 by the United States Bureau of Mines.

The increase broke a 5-month steady decline in production which had brought daily output down from 3,873,400 barrels in March to 3,565,300 barrels in August, but because of the shorter month, total output of 109,337,000 barrels was more than 1,000,000 barrels under the August figure of 110,523,000 barrels, although about equally above the 108,168,000 barrels of September, 1939.

Running consistently above 1939 in all months, output for the first three quarters of this year totaled 1,021,005,000 barrels, an increase of nearly 98,000,000 barrels over the 923,361,000 barrels produced in the corresponding period last year, the bureau reported.

The heavy gain in the daily average output in September was more than offset by heavier consumption, particularly runs to stills, the bureau found, so that there was a moderate reduction in crude oil stocks, the first in nearly a year.

Texas was largely responsible for the

Wholesale Prices of Refined Products

REFINED GASOLINE	Range late Last week (Cents a gal.)		Changes from week Before	
Oklahoma Refineries:				
60 Octane and under	3⅝	4¼	...	...
63-66 Octane	4⅛	4½	...	...
72-74 Octane	4½	5	...	...
Mid-Western Tank Car:				
60 Octane and under	3⅝	4¼	...	...
63-66 Octane	4⅛	4½	...	...
72-74 Octane	4½	5	...	...
New York Harbor:				
68-70 Octane	5	5½	...	...
72-74 Octane	5	6½	...	...
Gulf Coast:				
60 Octane unleaded	3⅝	4½	...	...
65 Octane unleaded	3⅝	4⅝	...	...
72-74 Octane leaded	3⅜	4⅜	...	...
NATURAL GASOLINE				
Grade 26-70:				
F.O.B. Group 3	2¾	2¾	...	...
F.O.B. Breckenridge, Texas	2½	2½	...	...
KEROSENE				
Oklahoma Refineries:				
41-43 water white	3⅞	4	...	—⅛
42-44 water white	4	4⅛	...	—½
Mid-Western Tank Car:				
41-43 water white	3⅞	4⅛	...	...
42-44 water white	4	4⅛	...	—½
New York Harbor	5⅛	5⅛	+⅜	...
RANGE OIL				
At Oklahoma Refineries	3½	3⅝	...	—⅛
In Mid-Western Market, Group 3, basis	3⅝	3⅝	...	...
LIGHT FUEL OILS				
Oklahoma Refineries:				
No. 1 straw	3⅜	3½	...	...
No. 3	3¼	3⅜	...	...
Mid-Western Tank Car:				
No. 1 white	3½	3⅜	+⅛	...
No. 3	3⅛	3⅜	...	...
New York Harbor:				
No. 1	4¾	5⅛	...	...
No. 3	4⅛	4½	...	+¼

HEAVY FUEL OILS	Range late Last week (Per Bbl.)		Changes from week Before	
Oklahoma Refineries:				
No. 6	$0.55	$0.55	...	...
Mid-Western Tank Car:				
No. 5	.75	.75	...	...
No. 6	.50	.50	...	...
New York Harbor:				
No. 5	1.35	1.55	...	...
No. 6	1.15	1.25	...	...
BUNKER C FUEL OIL (Per barrel, ships bunkers)				
Gulf Coast	$ .80	$ .90	...	...
New York Harbor	1.15	1.25	...	...
DIESEL OIL (Per barrel, ships bunkers)				
Gulf Coast	$1.50	$1.70	...	...
New York Harbor	1.70	1.70	...	...
Los Angeles Basin, 27 gravity	1.15	1.35	...	...
LUBRICATING OIL (Cents a gal.)				
Oklahoma Refineries:				
Bright Stock, 150-160 viscosity at 210°, 10-25 pour test	13	15½	...	...
Neutral oil, pale No. 3 color, 150 viscosity at 100°, 0-10 pour test	8	10¼	...	...
Western Pennsylvania:				
Bright Stock, 145-155 viscosity at 210°, 25 pour test	12	13	...	...
Neutral Oil No. 3 color, 150 viscosity at 70°, 25 pour test	19	19	...	...

Added Production Day in Texas Boosts U. S. Crude Output

Estimates Compiled by THE OIL WEEKLY

DISTRICT OR STATE	Bureau of Mines Estimate of Daily Demand (Nov.)	State Allowable (Barrels Daily in Nov.)	BARRELS DAILY FOR WEEK ENDED Nov. 2	Nov. 9
TEXAS				
Texas Panhandle	.....	.....	85,900	74,000
North Texas	.....	.....	100,400	107,600
West Central Texas	.....	.....	27,900	30,500
West Texas	.....	.....	220,800	223,250
East Central Texas	.....	.....	71,800	78,100
East Texas Field	.....	.....	301,500	375,500
South Texas	.....	.....	209,200	210,850
Texas Gulf Coast	.....	.....	221,700	245,550
Total Texas	1,291,000	1,430,257*	1,239,200	1,345,350
CALIFORNIA—				
Long Beach	.....	.....	41,800	43,200
Midway-Sunset	.....	.....	38,600	54,800
Kettleman Hills	.....	.....	46,200	37,700
Wilmington	.....	.....	80,000	81,000
Others	.....	.....	376,700	398,900
Total California	583,000	571,000†	583,300	615,600
OKLAHOMA—				
Oklahoma City	.....	.....	94,300	89,550
Seminole Area	.....	.....	99,850	100,625
Others	.....	.....	200,350	202,650
Total Oklahoma	413,000	390,000	394,500	392,825
ILLINOIS—				
Salem	.....	.....	135,500	136,000
Louden	.....	.....	71,000	66,000
Centralia	.....	.....	18,000	17,900
Other New Pools	.....	.....	107,800	111,700
Old Pools	.....	.....	9,800	10,600
Total Illinois	385,000	349,500	342,100	342,300

DISTRICT OR STATE	Bureau of Mines Estimate of Daily Demand (Nov.)	State Allowable (Barrels Daily in Nov.)	BARRELS DAILY FOR WEEK ENDED Nov. 2	Nov. 9
LOUISIANA—				
North Louisiana	.....	.....	66,800	67,100
South Louisiana	.....	.....	215,200	210,500
Total Louisiana	274,000	279,973	282,000	277,600
KANSAS	186,000	190,000	182,700	168,950
NEW MEXICO	104,000	104,000	101,500	101,100
EASTERN STATES—				
Pennsylvania Grade	66,100	.....	68,250	72,100
Others, Eastern	20,300	.....	20,250	20,200
Total, Eastern States	86,400	.....	88,500	92,300
MOUNTAIN STATES—				
Wyoming	75,000	.....	76,500	72,600
Montana	18,900	.....	18,300	18,200
Colorado	3,700	.....	3,400	3,400
Total Mountain States	97,600	.....	98,200	94,200
MICHIGAN	51,000	.....	48,200§	47,300
ARKANSAS	71,000	.....	69,200	69,100
INDIANA	14,200	.....	19,200	20,200
MISSISSIPPI	13,800	.....	16,700	14,650
NEBRASKA	.....	.....	3,300	2,200
‡Total 8 Prorated States	2,973,000	.....	2,900,600	3,018,825
Total United States	3,570,000	.....	3,468,600	3,584,675

* Net basic daily allowable as of November 1. Texas fields will be shut down November 2, 3, 9, 10, 16, 17, 24, 28 and 30, under previously issued order, and net allowable will increase with completions of new wells.
† Recommendation of Conservation Committee of California Oil Producers.
§ Estimate of actual production that will occur under prescribed regulations, which do not fix a definite state total allowable.
‡ Texas, California, Oklahoma, Louisiana, Kansas, New Mexico, Arkansas, Michigan.

Westinghouse Type SU Speed Increaser coupled with a Goulds pump and a De La Vergne Diesel Engine installed at the San Diego, Texas, Pumping Station of the Continental Pipe Line Company.

Type SU Speed Increasers are built to order. Dependable service is assured because every unit is designed and built to meet individual requirements. Each one is built to order to meet the specific requirements of the prime mover and driven machine. The result is a perfectly matched assembly in which the maximum performance qualities of each piece of equipment are retained. With a Type SU Speed Increaser on the job, you can expect years of trouble-free service.

To prevent vibration, each gear is dynamically balanced on a special machine developed by Westinghouse Research Laboratories. An extra heavy housing gives the assembled unit added strength, assures permanent alignment of rotating parts, and helps to dampen external vibration. A positive forced-feed circulating oil system keeps moving parts properly lubricated. An oil spray, directed to the mesh line of the gears, keeps gears running smoothly and quietly with a minimum of wear.

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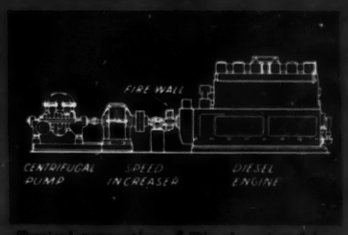
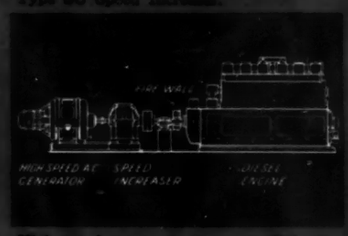
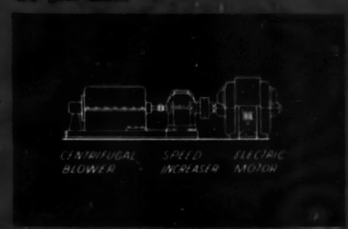


Typical connection of Diesel engine drive to high-speed centrifugal pump through Type SU Speed Increaser.



High-speed a.c. generators are efficiently driven by Diesel engines through Type SU gear units.



Centrifugal blowers are easily and efficiently driven by the use of Westinghouse Type SU Speed Increasers.

Westinghouse Geared Drives

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increase in output, with a rise of 100,000 barrels to 1,318,300 barrels a day, it was explained. The increase was general throughout the state with the exception of East Texas, where production declined. Most of the other important producing states showed declines, but daily output in both Kansas and Louisiana rose about 10,000 barrels above the August levels. Illinois production continued to slump, but at a much slower rate than in the two preceding months, the daily average dropping from 389,500 to 364,200 barrels.

Unchanged from August, the yields of gasoline and distillates were 43.9 and 13.7 percent, respectively, the former having been 1.2 percent higher and the latter 1.4 percent lower a year ago.

"The domestic demand for motor fuel in September was 52,297,000 barrels, or six percent higher than a year ago," the report stated. "Exports of motor fuel were higher than generally expected, but the total of 1,907,000 barrels was less than half what it was in September, 1939. The favorable demand situation was nullified by increased runs to stills so that the reduction in gasoline stocks was below expectations. Inventories of finished and unfinished gasoline declined from 83,701,000 barrels the first of the month to 81,907,000 barrels on September 30, the latter being about 11,000,000 barrels above the level of last year.

"The domestic demand for gas oil and distillate fuel was seven percent above a year ago, but the domestic demand for residual fuel oil was five percent lower."

Production of aviation gasoline again increased, the September output being 1,107,000 barrels compared wtih 957,000 barrels in August. Exports were lower, 301,000 barrels against 569,000 barrels, as was domestic demand, 463,000 barrels against 5,085,000 barrels, and stocks increased from 4,277,000 to 5,428,000 barrels during the month, it was shown.

Bureau of Labor Statistics figures placed the price index for petroleum products at 48.9 in September, compared with 49.2 in August and 53.3 in September, 1939. The crude-oil capacity represented in the report was 4,310,000 barrels, giving an operating ratio of 83 percent, compared with 81 percent in August and 85 percent in September, 1939.

Oil Discussed as Texas Statistical Group Meets

A panel discussion of the petroleum industry constituted a part of the program of the Texas Statistical Council at Austin November 8.

On the program for the discussion were the following: Dr. E. L. DeGolyer, geologist, Dallas, chairman; Dr. W. E. Wrather, geologist, Dallas; H. J. Struth, of the Texas Mid-Continent Oil and Gas Association, Dallas; and W. N. Finnegan, Jr., head of the statistical department of Humble Oil & Refining Company, Houston.

Texas Permits

The Texas Railroad Commission last week authorized permits for drilling 116 wells, 156 less than were allowed the week before.

Eight permits were granted in the East Texas field, with six in Gregg, one in Rusk and one in Smith County. From the remainder of the East Central Texas district, five locations were reported.

Operators in West Texas were permitted to drill 13 wells, while 20 locations were listed from the West Central Texas District. Southwest Texas led the state with 40 permits, and Gulf Coast producers reported 18 locations.

Twelve permits were granted in North Texas, while none were reported from the Panhandle.

Raise Colletto Creek and South Clara Driscoll

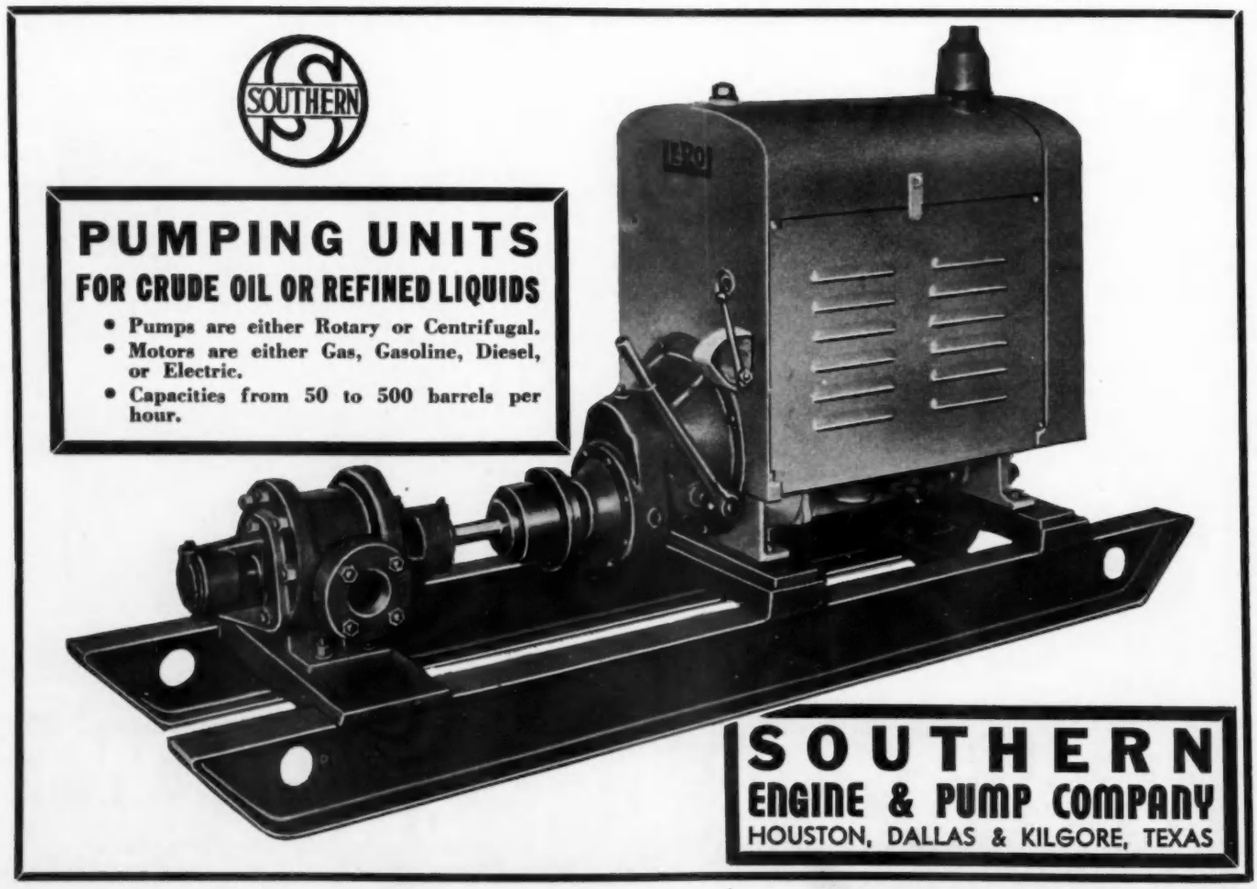
The Texas Railroad Commission has issued an order, effective November 2, increasing the allowable for the South Clara Driscoll field from 2216 to 2708 barrels daily, the increase applying exclusively to wells producing from the 5000- and 6500-foot sands.

The allowable for the Colletto Creek field has been raised from 421 to 631 barrels daily, effective November 2.

Ask Boost for Caplen

An increase in the allowable for the Caplen field, Galveston County, was requested by Sun Oil Company at a hearing before the Texas Railroad Commission last week. There are 10 producing wells in the field, and the company asked that the field allowable be raised from 300 to 800 barrels a day.

Company representatives stated that the oil was used for blending, and that the stock on hand was 30 percent lower than it was on June 1. Production comes from 7200 feet.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U. S. FIELD OPERATIONS

Illinois

Wildcat Strikes Recorded for Perry and Effingham Counties

Wildcat strikes were recorded in Perry and Effingham counties with several other prospective pool-openers in various stages of completion.

Northwest of Tamaroa, 3½ miles, Perry County, G. H. Blankenship was drilling plug to test nine feet of Cypress-sand saturation in E. F. Malinsky 1, NW NW NE 24-4s-2w, topped at 1116 feet with pay at 1120-29, and casing was cemented at 1113 feet. Total depth was 1130 feet. The test was drilled into Benoist sand, which carried oil and water, to 1338 feet, and then plugged back.

Meanwhile, Blankenship was setting surface pipe at a new wildcat he believes on the same structure two miles west of Malinsky 1, Bathon Estate 1, CSW SW NE 15-4s-2w. Rotary tools were being moved in for another test in the area, Thompson's Katie Prusacki 1, SW NE 13-4s-2w, ¼ mile north and ½ mile west of a dry hole drilled by Blankenship about a year ago.

Casing was cemented at an Effingham County wildcat 15 miles from production to test an excellent showing of McClosky oil, Kilpatrick and Hartshorn's Mason Community 1, SE SE NW 22-6n-5e, at the edge of the village of Mason. Seven feet of saturation was recovered at 2489-96 feet and casing was set at 2485 feet. During a drill-stem test open 19 minutes, the well made a small flow of oil and some gas. At an elevation of 588 feet, Mason 1 found the Benoist at 2334 and St. Genevieve at 2452 feet. The Cypress shaled out.

E. S. Adkin's promising Franklin County wildcat near Benton, Orient Coal Company 1, NE SW SE 24-6s-2w, was waiting on cement after casing was set to 2110 feet, preparatory to testing a Tar Springs showing at 2111-23 feet. Saturation also was cored at 1704-12 feet. The well, several miles from the county's only productive area at Thompsonville, was drilled to the St. Louis at about 3100 feet and then plugged back. Shell Oil Company is one of the largest acreage holders in the area. Considerable royalty buying was under way in the vicinity of the test.

Gallatin Wildcat Still Testing

The Carter Oil Company was still testing its Gallatin County wildcat, R. M. York 1, after plugging back from the Hardinsburg to 2050 feet. The well swabbed 39 barrels of oil and 90 barrels of water in 12 hours from the Palestine sand at 1699-42 feet. However, the operators believed the water was fresh and could be depleted, and were continuing swabbing operations. Water and mud was bailed in a test of the Hardinsburg at 2142-59 feet and after a 10-quart shot water and only a small amount of oil was bailed. The well was plugged back to test the shallower horizon.

Kingwood Oil Company's northern Hamilton County wildcat, Williams 1, CS½ SE NE 3-4s-6e, swabbed 62 barrels of oil and 216 barrels of water in 24 hours, following a squeeze job, from McClosky at 3461-66 feet. The operators planned to continue testing the well, which, if successfully completed, would open a new field. The company's Prince 1, outpost to the Dale field, Hamilton County, NW SW NW 31-5s-7e, was coring at 3219 feet.

In Jasper County, Continental Oil Company plugged Toland 1, SW 34-7n-8e, which a few days earlier made 80 barrels of oil in 9½ hours from the McClosky. However, water began encroaching and a squeeze job and plug-back failed to shut out water. Total depth was 3020 feet, with McClosky top at 2957 feet. The test was 12 miles from production.

Kingwood Oil Company abandoned a Marion County wildcat, Sam Lowe 1, CW½ SE NW 18-4n-3e, near the town of Kinmundy, at 2235 feet in McClosky lime. The company was moving rotary tools three miles north of Lowe 1 for a new wildcat, Aukamp 1, CSW SE 30-5n-3e, Fayette County.

The Centralia townsite Trenton test, Allen Borton's Storer 1, NE 13-1n-1w, was still being swabbed following a 3000-gallon acid treatment at 4058 feet. Immediately after the acid, the well swabbed about 12 barrels hourly. Another treatment of 5000 gallons was planned.

Southernmost activity in the state is in Pope County where The Ohio Oil Company was drilling below 600 feet at General American Life Insurance Company 1, SW SW SE 10-11s-5e, four miles east of the town of McCormack. About three miles southwest of this test, L. V. Garnier was moving in rotary tools for Peoples 1, NE NE NE 30-11s-5e.

North of Mt. Carmel, Wabash County, Union Petroleum Company was cleaning out Felty-Gould 1, CW½ NW SE 17-1s-12w, to test a Cypress show at 2050-60 feet. An east outpost to the field northeast of Keensburg, Wabash County, Tide Water Associated Oil Company's Mary Buccholz 4, was waiting on cement after setting casing to test 11 feet of Cypress-sand saturation.

Immediately northeast of Albion, Edwards County, Don Baines' Nelli Hodgeson 1, NE NW NE 1-2s-10e, a wildcat, was drilling below surface casing. A successful completion would assure an Albion townsite drilling campaign.

Illinois Producing Corporation's W. W. Spottswood 1, Richland County wildcat in the CN½ SW SW 1-2n-10e, was abandoned at 3398 feet in the McClosky.

Kentucky

Birk City North Side Gets First Start in Several Months

In Daviess County, on the north side of the Birk City pool, St. Louis Oil & Gas Company is ready to spud Rosa Logsdon 1, first new operation this area has seen for several months.

South of Beals, Henderson County, Jack Akers et al George Fulton 1, 4-P-26, was acidized with 2000 gallons in McClosky at 2101 to 2105 feet, and was pumping an estimated 50 barrels a day.

In Grayson County, Sun Oil Company's George Wood 1, eight miles west of Litchfield, was drilling at 1050 feet. Basin Drilling Company, Owensboro, is contractor.

In the Utica field of Daviess County, W. E. Hupp et al Sheriff 1, was a Barlow sand completion, which initialed 35 barrels a day on pump after 35-quart show. Hole was bottomed at 1585 feet.

Indiana

Gibson County Wildcat to Perforate for McClosky Test

Mohawk Drilling Company and Major Oil Company's John W. Harmon 1, NE SE SW 17-3s-11w, Gibson County wildcat a mile southeast of Owensville, was preparing to gun-perforate casing at 2550 feet to test McClosky show at 2528-35 feet. Hole was bottomed at 2661 feet, in the St. Louis, where four feet of porous lime tested sulphur water. The test, a farmout of The Carter Oil Company, is a mile northeast of Major Oil Company's George Simpson 1, small St. Louis producer.

In Gibson County, Lewis Production Company's Effa K. Brady 1, wildcat in NE SW 14-2s-12w, eight miles west of Princeton, was spudding, while Cherry & Kidd's Hall-Garrett 1, SW NW SW 31-2s-12w, eight miles southwest of Owensville, was drilling at 1300 feet with non-commercial shows reported in the Pennsylvanian sands.

In the McClosky pool south of Vincennes, Knox County, Dee Miller's Ed Sannaman 1, NE NE SW 24-2n-11w, was swabbing 20 barrels an hour, natural, from Rosiclaire at 1822-28 feet, showing for an estimated 500-barrel well.

In the Rockport gas field of Spencer County, James C. Ellis' Fred Fisher 1, C SE NE 29-7s-6w. which failed to get a show in the Palestine or Waltersburg, was drilling below 1500 feet for a McClosky test.

Abandoned was a Vanderburgh County wildcat, northern Scott Township, and just south of the Gibson County

line, Burr Lambert's Neiderhaus 1, SW NW NW 22-4s-10w, bottomed at 2237 feet. McClosky at 2217-19 feet carried sulphur water.

In the Griffin field of Gibson County, an east outpost, Continental Oil Company's Stella Green 1, SW SW SE 26-3s-14w, was deepening to test McClosky, after getting promising shows in Waltersburg and Tar Springs. Cypress was dry.

On the southwest edge of the South Griffin field of north Posey County, Continental Oil Company's Kleiderer A-3, SE NE NE 33-3s-14w, was waiting on cement to test about nine feet of McClosky saturation.

A Posey County wildcat ¾ mile northeast of Griffin, Ed S. Holmans' John G. Oeth 1, NE SE NE 6-4s-13w, was reported drilling at about 2800 feet.

Oklahoma

Seminole Receives Wilcox And Senora-Sand Pools

Amerada Petroleum Corporation has opened a new Wilcox-sand pool 1¼ miles southwest of West Seminole pool at Campbell 1, CN½ SW SW 30-9n-6e. Sand was topped at 4220 feet, and first oil showed at 4233 feet. When bit reached 4237 feet, hole immediately filled 600 feet with oil in 50 minutes. Over-night, showing increased to a 1000-foot column of fluid in 6⅝-inch casing set at 4152 feet in the Viola lime. Oil tested 42-gravity, and gas gauged 100,000 feet per day. Tankage has been erected for a production test. The company has a block of 400 acres surrounding the discovery. Northeast of this strike ½ mile, Stanolind Oil & Gas Company completed Grisso 1, NE NW SW 15-9n-6e, flowing 70 barrels of oil in 24 hours through tubing without a show of water. Senora sand was topped at 2893 feet and shot with 20 quarts at 2910-20 feet. Hole is bottomed at 2924 feet. This is a new discovery in the Seminole City area.

Davon Oil Company's Sporleder 1, C SW NW 35-12n-9e, wildcat north of Okemah, Okfuskee County, topped Hunton lime at 3978 feet and cemented 7-inch casing at 3975 feet. Two cores were recovered with small oil shows, and operators ran electric log. Plugs will be drilled with rotary tools. Shell Oil Company's Curry 2, SE SW NW 35-12n-8e, farthest east well in the new northwest extension development in Dill pool, Okfuskee County, was blowing in for a large producer. Cromwell sand was topped at 3558 feet and 4½-inch casing cemented at this depth. Plugs were drilled to 3607 feet. In 10 minutes, it filled the separator with 25 barrels of oil. Same operators completed Replogle 4, NEc SE 35-11n-8e, East Cromwell pool, for a flowing gauge of 816 barrels of oil and 250 barrels of water in 24 hours. Hole is bottomed at 3469 feet in Cromwell sand.

New Sand at West Weleetka

A new sand zone is productive in West Weleetka pool, Okfuskee County, a 1940 discovery. W. A. Flemming et al's McKinney 2-A, SW SW NW SE, was completed for 3,500,000 feet of gas per day. Two upper sands, topped at 1060 feet and 1155 feet, respectively, are producing zones. Total depth is 1178 feet. Other wells produce from Booch sand around 2200-2300 feet. Summit Drilling Company also completed Steil 7, SE SE NE SW 18-10n-11e, for 2,000,000 feet of gas. Sand was logged at 1226-51 feet.

Gulf Oil Corporation and The Carter Oil Company's Qualls 1, C SW NE 23-1n-7w, 2½ miles northeast of Duncan, was rotating below 10,350 feet, with Helmerich & Payne, Inc., operating tools. It is the deepest drilling wildcat in the state.

Strike Makes 177 Barrels

Shell Oil Company completed its Linihan strike in NE SE NE 31-15n-7e, Creek County, for a flowing gauge of 177 barrels of oil and 29 barrels of water in 24 hours. Crude tested 40-gravity, 2,000,000 feet of gas. Second Wilcox sand was topped at 4079 feet and squibbed with 100 quarts at 4090-4115 feet.

H. L. Berkey et al's Gragg 2, NE SE SE 32-12n-6e, Lincoln County portion of Prague pool, flowed and swabbed 190 barrels of oil in 8 hours and swabbed down. Testing was resumed after shooting Senora sand at 3285-99 feet with 40 quarts. Pay was topped at 3276 feet, and 7-inch set at 3280 feet.

Cumberland pool of Marshall and Bryan counties was active, with three completions and three first reports. The Pure Oil Company's Little (100) 2, SW

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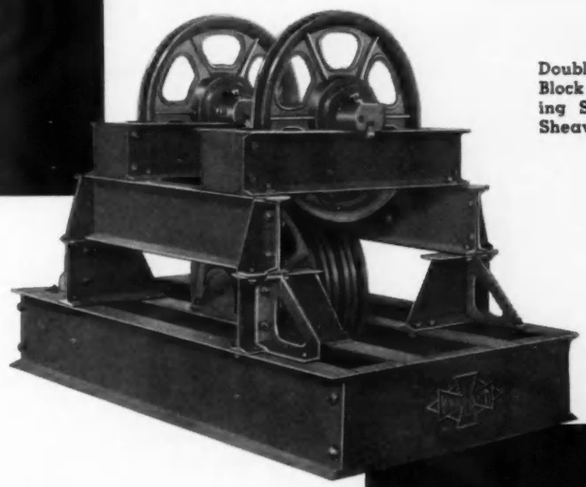

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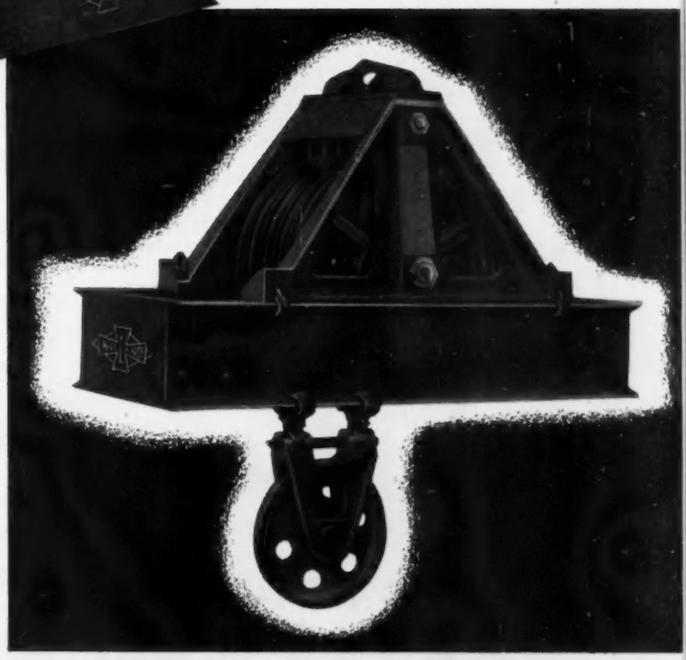

THE WHELAND COMPANY

ROTARY DRILLING EQUIPMENT

Chattanooga, Tenn.

NW SE 28-5s-7e, flowed 671 barrels in 24 hours through casing and tubing. Bromide Dense was logged at 4639 feet with first sand topped at 4924 feet and second sand at 5055 feet. Hole was bottomed at 5097 feet. Little (101) 2, NE SW NE 28-5s-7e, flowed 364 barrels in 24 hours through an 11/64-inch tubing choke. Bromide Dense was topped at 4501 feet, first sand was absent, second sand was topped at 4898 feet, third sand logged at 5035 feet, and hole carried to 5075½ feet. Little (201) 1, NE SE SE 28-5s-7e, topped second sand at 4909 feet and drilled to 5063 feet. In 24 hours, flow tested 376 barrels through a 14/64-inch choke on 2½-inch tubing. Locations were staked for Little (204) 1, NEc SW 28-5s-7e; Little (201) 2, SW SE SE 28-5s-7e, and Metz (105) 2, NE SW NW 28-5s-7e.

Kansas

Graham County Wildcat Has High-Gravity Oil in Lansing

R. W. Shields et al's Paxson 1, NEc 11-8-24w, 17 miles northwest of Morel pool and 6 miles west of Hill City in Graham County, had high-gravity commercial oil, when, after drilling to 4100 feet in dry Arbuckle lime, casing was perforated with 33 shots in Lansing lime at 3750-56 feet, with plug cemented at 3781 feet. Over 2100 feet of 34.7-gravity oil immediately entered the 5½-inch casing. Log disclosed Anhydrite topped at 1945 feet, Lansing 3558 feet, Topeka 3148 feet, Cherty conglomerate 3940 feet, and Arbuckle lime at 3965 feet. Tubing was run before acidizing and testing.

Significance of the strike lies in the fact that Lansing lime was thought heretofore not to carry high-gravity crude in this goelogic area. Sole producing area in Graham at present is Morel pool, discovered in 1938 by Continental Oil Company, after a core-drill campaign in 1930-31, and jointly owned with Cities Service Oil Company. Production in this area is Arbuckle lime with oil averaging 43-gravity. Ray pool, Phillips County, is 20 miles northeast, and produces 32-gravity crude from Reagan sand.

Two miles east of Roxbury pool, McPherson County, F. S. Williams, Joe Morine et al's Henne 1, SWc NE 21-17-1w, had a fill-up of 1800 feet of oil in 20 hours after drilling plugs in Chat formation. Topped at 2645 feet, the lime horizon was saturated at 2658-61 feet. Previously the wildcat filled with water at 2198-2208 feet in the Kansas City lime topped at 2071 feet. Operators may acidize before testing.

Extensions

The Texas Company extended Kraft pool, Barton County ⅝ mile northeast at Burmeister 1-B, CW½ NW SE 2-17-11w, establishing a draw-down potential of 1790 barrels in 24 hours after treating Arbuckle lime at 3363-82 feet with 4000 gallons of acid. Same operators staked Disque 6, SE SW SW 3-17-11w.

Hayes & Anschutz et al's Fink 1, SWc SE 16-14-14w, ½ mile northwest of Hall-Gurney pool, Russell County, pumped 384 barrels daily. Lansing lime was topped at 3034 feet, and hole carried to 3282 feet. With cement plug set at 3120 feet, pay was acidized with 1000 gallons.

Blue Hill pool, Ellis County, was extended ¾ mile east at Tom Palmer et al's Smith 1-C, CWL S½ NW 13-12-16w, which swabbed 160 barrels of crude per day. Arbuckle lime was penetrated to 3354 feet.

Kansas City-lime production was extended in the Eckel area of Butler County. Bennett & Abel et al's Lindley 1, SW SE SW 6-27-7e, pumped 50 barrels in 24 hours from pay at 2182-92 feet, treated with 1500 gallons of acid. The discovery rated a potential of 40 barrels of 36-gravity crude.

C. L. Carlock et al's Karber 1, CW½ NW NW 7-19-10w, East Rick pool discovery, Rice County, established a temporary pumping potential of 280 barrels of 34-gravity oil per day from Arbuckle lime, topped at 3343 feet and penetrated 7 feet. Pay was jetted with 3000 gallons of acid.

North Victoria pool, Ellis County, remains a one-well discovery. Gulf Oil Corporation's Alex 1, CN½ SE SE 30-13-16w, was plugged in dry Arbuckle lime at 3478-87 feet. Same operator's Kuhn 1, C NL SE SW 30-13-16w, ¾ mile west of production, showed water after perforating Arbuckle lime at 3531-3536 feet. Total depth is 3580 feet.

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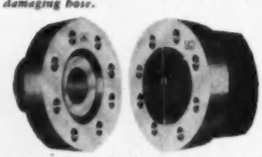

Fig. 2: The Grizzly Adapter "A" is recessed to accommodate the end of the Hose "B" which is built integral with the Coupling "C". Both the Adapter and Coupling Flange are precision machined to perfect fit. The steel-to-steel connection between Adapter and Coupling positively prevents damaging hose in any manner.

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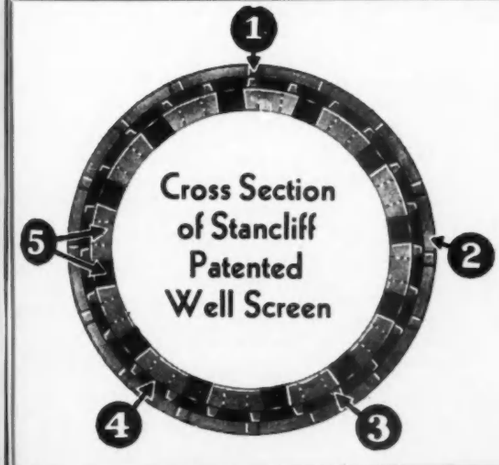

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Forest City Basin

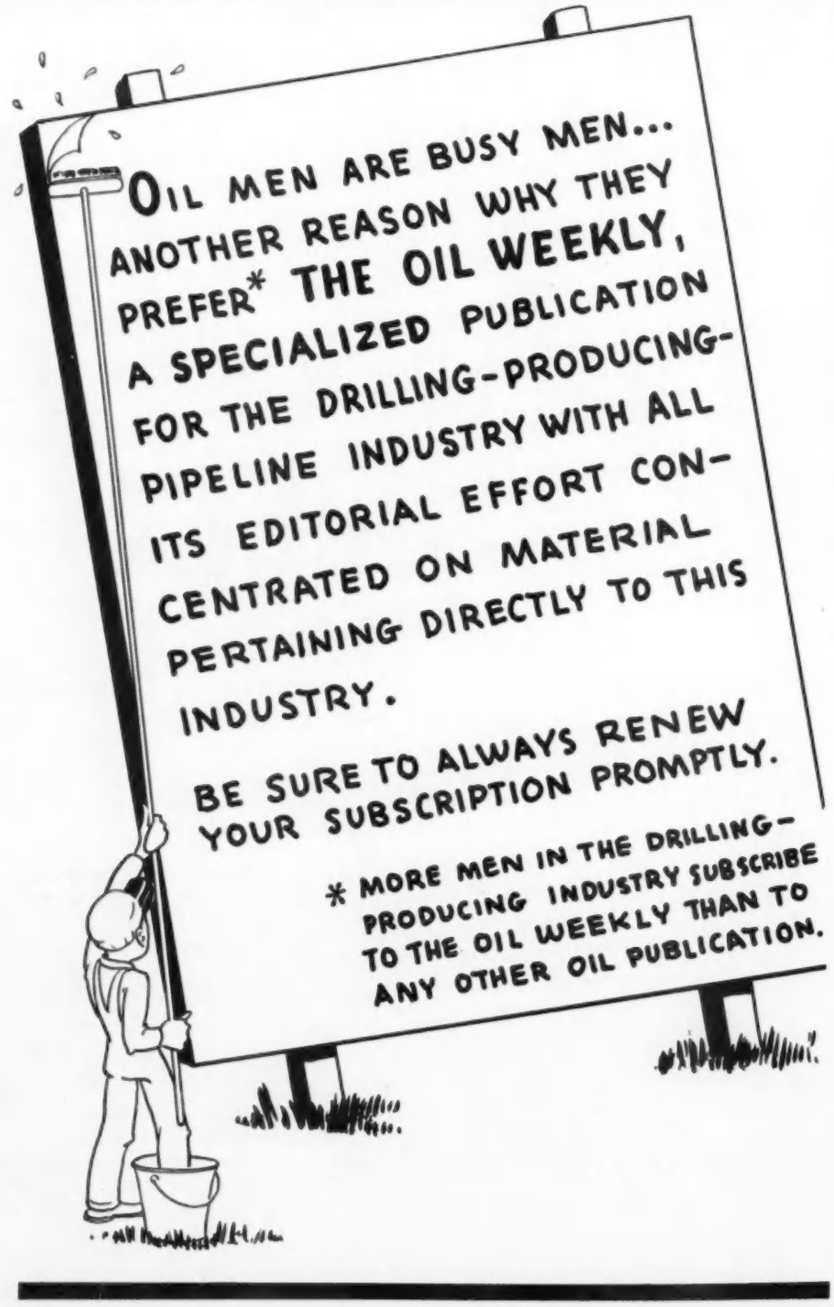
Small Extension for Falls City; New Kansas Activity

R. L. Campbell extended Hunton lime production in Falls City pool ¼-mile south when Schrock "B" 1, C NW NE 29-1n-16e, after acid, pumped 528 barrels of oil in 24 hours with a casing pump. Hole is bottomed at 2343 feet in lime.

At south end of Falls City pool and ½-mile west of above extension, Guy Scott et al's Tolle 1, NE NW NW 29-1n-16e, filled 1800 feet oil in 14 hours from Hunton lime, topped at 2362 feet and penetrated 2 feet.

Activity spread to virgin territory of Northeastern Kansas as Chester L. Carlock moved in machine to drill Ross 1, C SW 31-3s-20e, 40 miles southeast of Falls City pool in Nebraska, 7 miles southwest of Troy and 15 miles northwest of St. Joseph, Missouri. This tri-county spot has looked promising to oil operators since early basin developments. Considerable core-drill work has been carried throughout Brown, Nemaha and Doniphan Counties of Northeastern Kansas.

In Nemaha County, Kansas, Bumpus, Hibbard et al's Achten 1, C S½ SE NW 12-4s-14e, 4 miles north of Goff, set 8-inch casing at 1759 feet and was drilling below 1900 feet. Three miles south of Oskaloosa pool in Jefferson and Leavenworth Counties, Dan McLaughlin & Son was rigging up to drill Thorp 1, C NE NE 27-10s-20e, on the Leavenworth County side.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Boice Area

Pawnee Royalty Company's Bucholtz 2, C NW NW 17-1n-16e, an east offset to the Boice discovery well, topped Hunton lime at 2300 feet, and Viola lime at 2925 feet. Two attempts to find production in the lower lime have failed, and rig was moved to Bucholtz 3, SE NW SW 17-1n-16e. West offset to the discovery was staked by Robert McIntyre at Boice 1, NW NE 18-1n-16e. R. L. Campbell et al's Schock 2, SW NE SE 20-1n-16e, had derrick while E. J. Shaffer was testing Hunton lime at Sandrock 2, NE NW SW 20-1n-16e.

Raymond Pulliam, Clifton Gall et al's Lawrence 1, SEc 34-5n-15e, east of Auburn in Nemaha County, Nebraska, was drilling with rotary tools. Jackson & Rust spudded Dalke 1, C NE NE 14-3n-13e, in Northeastern Pawnee County.

Seven miles northwest of Falls City pool, I. T. I. O. Company's Bankers Life 1, C NE SE 3-2n-15e, will shoot Hunton lime for possible production. Topped at 2418 feet, a core at 2424-31 feet showed top foot with fair saturation, four feet of dense lime and one foot of fair saturation. Seven-inch was cemented at 2420 feet and hole plugged at 2449 feet from a previous bottom at 2476 feet. E. V. Jackson et al were testing some oil and water at Eickhoff 1, C NE NW 4-2n-16e, north of Falls City, after treating Hunton lime with 1500 gallons of acid at 2508½-27½ feet.

Shrock et al temporarily abandoned Pogge 1, NWc 17-5n-13e, 7 miles west of Auburn, Nemaha County, at 2472 feet. Drilling unit was moved out when 20 perforations at 2306-16 feet and 500 gallons of acid failed to show results. Hunton was topped at 2300 feet and cement plug set at 2435 feet when testing.

Nemaha Development Company's Evans 1, C NW NE 32-5n-15e, wildcat in Nemaha County, recovered 10 feet of fine crystalline dolomite with bottom 6 feet showing scattered porosity at 2995-3009 feet in Viola lime topped at 2994 feet. Mississippi lime was based at 1960 feet, Hunton lime topped at 2218 feet and a section 687 feet thick logged prior to penetrating Maquoketa shale at 2905 feet. Frank Engles et al's Wheeler 1, NEc 9-4n-14e, 3 miles directly south of Auburn, reported a hole full of water with a scum of oil in sand at 2130-70 feet. At 2268 feet, operators were under-reaming 8-inch pipe to deepen.

Missouri Activity

Flory & Kilby et al's Meyer 1, SE NE NW 27-62n-39w, wildcat in Holt County, drilled to 70 feet when casing collapsed. They will skid rig and renew operations. Brin & Nathan's Decker 1, C NW NW 1-61n-38w, shut down at 2310 feet in Hunton lime.

In Platte County, Missouri Valley Oil & Gas Company was drilling below 600 feet at Brown 4, SW NW SE 12-51n-34w.

American Oil & Gas Company's Thompson 1, C SW SW 30-58n-31w, logged Mississippi lime at 1110 feet, Kinderhook shale 1533 feet, Hunton lime 1560 feet and was under-reaming 8-inch casing at 1790 feet. Rig was up at A. & W. Oil & Gas Company's Pickett 1, NWc SE 13-57n-23w, while Fred Jones et al's Kesler 1, SEc SW 16-59n-25w, was below 435 feet.

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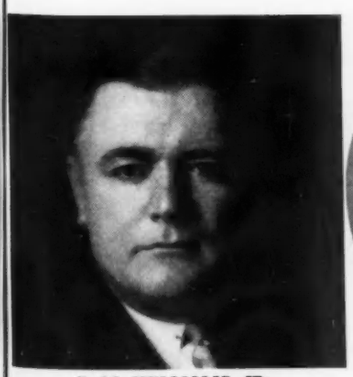

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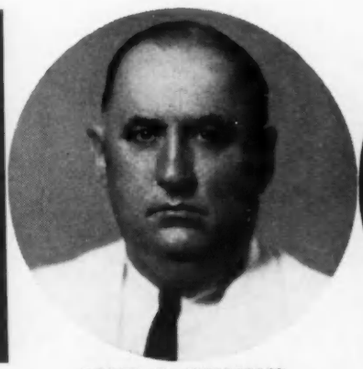

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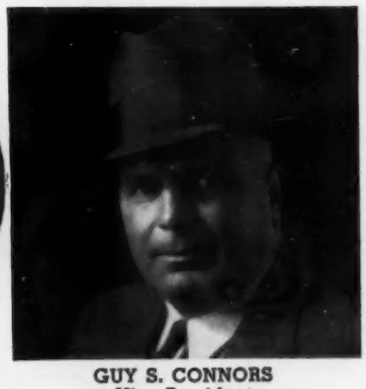

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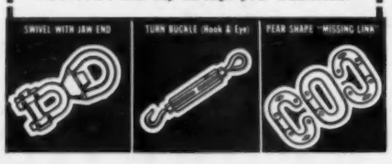

North Texas

Hapgood Outpost Has Large Flow; Montague Test Shows

Large initial flow was recorded by a northeast outpost for the Hapgood pool, Eastern Clay County Bend conglomerate strike made last July, but a more favorably situated test missed the discovery pay and will test a lower prospective producing zone. E. C. Norwood, King Oil Company et al's Hapgood 2, 1152 feet northeast of the discovery, flowed 96 barrels of oil the first hour and 100 barrels the second hour when tested through open tubing. Production is from broken pay at 5966-83 feet in Bend series, topped at 5897 feet, or 6 feet lower on structure than the partnership's discovery.

Phillips Petroleum Company's Hapgood 1, west offset to the discovery, entered the Bend at 5890 feet, or 5 feet high, but proved dry when formation tester was used at 5932-6010 feet. Shale and lime shells prevailed in deepening to 6040 feet, followed by broken conglomerate and lime to 6068 feet, with nominal oil saturation near bottom. Drill-stem test will be made. R. C. Lipscomb et al's Hapgood 1, 1000 feet southeast of the discovery, logged top of Bend at 5943 feet, according to log, and was drilling at 5975 feet. It is 18 feet low on the Bend marker.

E. C. Norwood et al's Shipley 1, Northeastern Clay County wildcat and 6 miles northwest of the Ringgold pool, entered the Bend series at 5841 feet, being 241 feet low when correlated with nearest producer, and was drilling shale and lime shells at 5940 feet. This test was temporarily abandoned in 1939 at 5066 feet. Walter Gant et al's Stine 1, west outpost for the north end of the Ringgold pool, failed to exclude salt water in plugging back from 5673 to 5646 feet, and has cemented back to 5633 feet.

Walter H. Gant et al's Will Laird 1, Southwestern Montague County wildcat, yielded show of oil and gas after perforating casing opposite saturation in Bend conglomerate at 5844-58 feet, and slight increase in gas was noted after making 35 shot holes at 5775-90 feet. It is to be given a swabbing test. Test was carried to 6651 feet, and 7-inch pipe was cemented at 6641 feet. Top of Bend was called at 5690 feet. Britt Cranfill, Rodgers et al's McKay 1, 2¾ miles south and in Wise County, succeeded in side-tracking drill pipe lost at 6067 feet, and re-entered Bend at 5580 feet, with broken conglomerate carrying oil stain and odor at intervals at 5797-5864 feet. Seven-inch pipe is cemented in the new hole at 5796 feet. Production test was due to get underway late last week.

The Bend horizon recorded a sharp dip in the Ross-Jolly pool, Western Clay County, when Petroleum Producers Company and Walter Gant's Ross 1, ½-mile west outpost, topped lime at 5516 feet, or 120 feet low. Pipe was cemented for a production test of broken lime, carrying nominal oil saturation at 5543-57 feet. Drill-stem test proved dry. R. H. Dearing & Sons' Hatfield 1, a mile northwest of production, was drilling shale at 5360 feet.

Jack Kadane et al's Griffin 1, ¾-mile east of the Griffin pool, Northwestern Archer County, was awaiting orders at 4522 feet after logging trace of oil saturation in the last two feet of hole. Development of the area has yielded two 4400-foot Strawn producers and a failure.

In Cottle County, Ramsey Petroleum Corporation's Lynch 1 encountered granite at 5689-94 feet, and was abandoned after drill-stem test in Canyon at 4380-4400 feet yielded salt water.

Magnolia Petroleum Company's Minnie Thom 4, Archer County sector of the K-M-A field, installed cable tools to drill plugs from 5½-inch pipe cemented on top of Ellenburger at 4398 feet. It is 22 feet higher on structure, according to Ellenburger correlation, than the company's Thom 3, ¼-mile southeast. The latter was the second producer for the field in the lower pay, and pumps 50 barrels oil plus water daily after plugging back to within 8 feet of the top of the Ellenburger.

W. B. Hamilton et al's Cartwright 22, third deep test for the Anarene shallow oil district, Archer County, was drilling shale and lime at 5150 feet, having failed to indicate production in Bend, topped at 4759 feet. It is seeking production near the 5150-foot horizon, which yielded oil and gas when Hamilton et al's Giddings 2, ½-mile southeast, was acidized and shot. The latter was abandoned in 1935 after deepening to 5426 feet.

Magnolia Petroleum Company's Parrish 15, NWc H&TC Section 26, southeast outpost for the Hull-Silk field, lacked sufficient saturation and porosity to make a producer in the Bend, topped at 4931 feet, and was drilling shale at 5030 feet. It will be carried to the Ellenburger. The Strawn beds were unfavorable for production. Cochran & Cain's Wilson 1, Lot 3, ATNCL Section 44, outpost for the northeast sector of the field, was abandoned at 4800 feet. Casing perforations at 4354-64 feet and 4055-70 feet yielded water. Gulf Oil Corporation's P. Siegel 24, south offset to the Bend discovery of the Hull-Silk area, was to run pipe after coring oil saturation at 4634-46 feet followed by shale to 4650 feet in Bend, topped at 4581 feet, or 46 feet low.

The Texas Company's Custers 1, east outpost for the Benton-Holmes pool, Eastern Montague County, failed to make a commercial producer from broken sand and granite wash at 3464-95 feet, with 7-inch pipe at 3460 feet, and logged shale in deepening at 3541 feet. United Producers Company and Continental Oil Company's Custers 1-B, west offset to 3470-foot flowing well, was flowing by heads from granite wash at 3710-18 feet, having missed the upper pay.

Sinclair Prairie Oil Company's North Bonita Unit 1, most easterly well in the Bonita pool, flowed 329 barrels oil through casing in 6½ hours from the lower conglomerate pay at 5477 feet, then earned a potential rating of 1501 barrels. The company's Howard 4 logged conglomerate pay at 5150-52 feet followed by shale and lime to 5160 feet, where drill-stem test yielded 1500 feet oil and 60 feet of salt water. Stanolind Oil & Gas Company's Dodson 1, west offset to the discovery of the Benton pool, east of Nocona, flowed 115 barrels natural in 3 hours through ¾-inch choke from Bend lime and conglomerate at 5118-30 feet. Ellenburger at 5165-76 feet proved dry, and the hole was plugged back to 5135 feet. Stanolind Pipe Line Company built 2½ miles of 4-inch line to this well, making two outlets for the area.

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West Texas

Examine Third Prospective Oil Zone at Wasson

A third prospective oil horizon below the regular Permian level in the Wasson field was being tested by Amon G. Carter, who has two deep tests under way on the same tract. Lease owners in the field and those holding acreage in the north portion of the Permian Basin are following the progress of this exploratory work, as the information gained to date reveals the presence of comparatively thick sections of oil saturation at levels heretofore untested in the district.

Carter's Wasson 5-D, SW SE PSL Section 50, Block AX, prepared to acidize through tubing after yielding oil on swabbing test at 5842 feet, with 7-inch pipe cemented at 5655 feet. Elevation is 3555 feet. This horizon was encountered but not tested by the original deep project, 1760 feet north, and is about 800 feet below the regular producing level for the immediate area.

Drilling was under way below 8200 feet on Carter's Wasson 4-D, and it is understood that it will be carried to the Ordovician series, or to 10,000 feet. It attracted attention mid-September in swabbing 2 to 3 barrels of green oil hourly after using acid at 6610 feet, with tubing packer at 6274 feet to exclude open hole below 5189 feet. Approximately 70-foot section of oil-saturated lime was encountered at the 7100-foot level, and this horizon also responded favorably to acid treatment by the dump method. Pipe will be run for a decisive test of both horizons if Wasson 4-D fails to encounter additional producing zones.

Humble Oil & Refining Company, second largest lease owner in the Cedar Lake 10-well pool, Northeastern Gaines County, elected to defer its entry as an operating unit by farming out lease on S½ SW D. & W. Section 4, Block H, to L. C. Harrison et al for 1/16 overriding royalty and mineral reservations below 5000 feet. Two immediate offsets are required. Development of the area has been confined to Stanolind Oil & Gas Company's discovery block. Majority of the wells require input gas to flow their allowable, which is marketed by tank trucks at Humble Pipe Line Company's Means field station.

Yoakum County Test

Production test through liner perforations opposite oil saturation logged at 5410-85 feet by Forest Development Corporation's Whisenant-Shell 1, Yoakum County semi-wildcat, was under way late last week. It failed to produce from the regular 5200-foot zone for the Waples-Platter pool and in drilling through the lower saturation encountered water at 5500-15 feet, with an elevation of 3565 feet.

Cascade Petroleum Company's Walker-Honolulu 1, Southeastern Hockley County wildcat, recovered parted drill pipe, and was drilling at 4820 feet. It is 3½ miles north by east of Bates & Phillips' Lockett 1, abandoned in 1937 in sulphur water at 5250-60 feet with an elevation of 3453 feet. Ray Rhodes and Atlantic Refining Company's Dean-Slaughter 1, Cochran County semi-wildcat and 2¾ miles west by south of the Duggan area, installed cable tools to drill plugs from 7-inch at 4975 feet. Geological markers indicate the test is on a favorable contour for production, but porosity in the lime will be a determining factor.

Natural flow of 100 barrels of 43-gravity oil per hour through 1-inch tubing choke was recorded by Taubert, McKee and Siemoneit's Crockett 1, northern Pecos County wildcat, after being shut in nearly 5 days to erect tankage. The gas volume was rated at 5,000,000 feet daily. Production is from broken sand at 5271-5357 feet in Simpson, topped at 4755 feet with an elevation of 2392 feet, and main pay was noted at 5320-40 feet. This Ordovician strike is 2 miles east of Imperial, and on a strike between the Sand Hills and Apco deep producing areas. Offsets will be required of Magnolia Petroleum Company and Phillips Petroleum Company, while 1941 lease expirations in the area will undoubtedly stimulate development.

Humble Oil & Refining Company's Shearer 1, ¼-mile northwest extension for the Apco pool, flowed 325 barrels of fluid, varying from 6 to 20 percent BS&W, in 6¼ hours after using 4000 gallons of acid in Ellenburger at 4731 feet. Tests were under way, according to late reports, to ascertain the source of the water. Top of Ellenburger was called at 4696 feet, or 2259 feet sub-sea,

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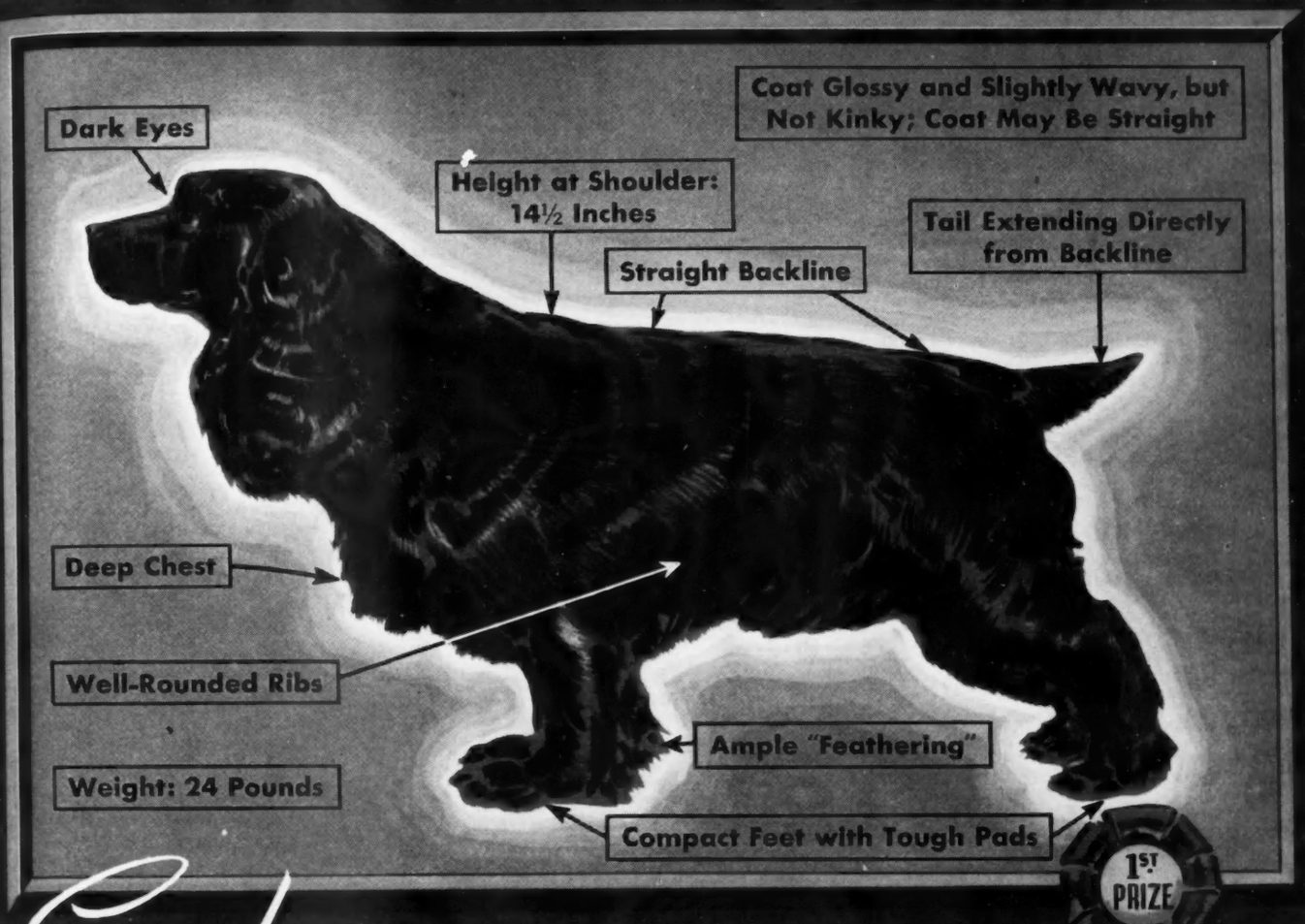

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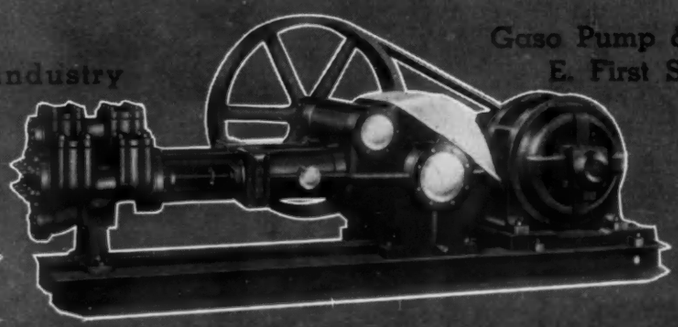

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Gulf Oil Corporation's Wristen 5, Ward County Ordovician test, encountered junk while drilling in new hole at 8973 feet after plugging back from Ellenburger at 9002-9187 feet. Another whipstock has been cemented at 8712-33 feet, and side-track operations will be resumed early this week. The company's University 1-F, Crane County wildcat, was drillling at 7896 feet, and is credited with having logged base of the Permian near this level.

East Texas

Limestone County Prospect Enhanced by Lease Activity

Expenditures by Gulf Oil Corporation for additional lease protection around a lower Trinity prospect in north-central Limestone County and on a secondary fault plane to the west of the Mexia field confirms showings for possible production logged in the Pettit and Travis Peak series.

The wildcat involves Frank Bryant and Farrell Drilling Company's Bevill 1, J. H. Murray Survey, and a mile southwest of Horn Hill, with hole bottomed in Travis Peak at 4937 feet. Cores recovered from Pettit topped at 4737 feet, and Travis Peak at 4892 feet, with an elevation of 506 feet, carried stain and odor in the porous zones. Electric formation survey also proved favorable. Proposed drill-stem test was held up while Gulf Oil Corporation carried on negotiations for the purchase of Bryant's half interest in the 114-acre drill site and full interest in about 6000 acres for a reported consideration of $150,000 cash, plus an overriding royalty interest.

The test was drilled largely through support given originally by Gulf Oil Corporation, which purchased 2500 acres for the 12,000-acre block for $17,500 cash, but subject to the completion of a Travis Peak test. The company is credited with having contributed another $5,000 for the purchase of holdout acreage within the block and for title work.

Workover operations failed to exclude the water developed by Bobby Manziel et al's Morrison 1, southeastern Wood County wildcat on the northwest flank of the Hawkins structure. Small volume of low-gravity oil with water was recovered on initial swabbing test at 4925 feet, and the status of the well remained unchanged after plugging back and drilling out a portion of the cement.

Southwest Texas

Discovery Ratio High With Less Lower Coast Drilling

South Texas Gulf Coast was adding slight field expansions plus new sands to keep the discovery ratio high. Despite a general decline in drilling from 1939, new discoveries this year have materially exceeded the number in the same period of last year.

Fred W. Shield and Allen & Morris have finally completed a producer in Allen and Gallagher 1, 4700-foot north outpost to the Shield field of Nueces County and on a Southern Minerals Corporation farmout. A series of tests had been made through perforations in a 6900-foot Frio zone, the last being at 6970-74 feet. The well was making a large volume of gas and flowing 3 to 4 barrels of 56-58-gravity distillate per hour through ¼-inch choke, pressures being 2400 pounds on tubing and 2525 pounds on casing.

When shut in, the above well would build up a head of high-gravity oil. Opened, the gas soon overtakes the operation and it again flows distillate. The new sand is 300 feet below the discovery pay.

Richardson Petroleum Corporation's Guaranty 1, ½ mile east of the Agua Dulce field's southeast flank production, was in as a producer, although the definite gauge was lacking. Perforations had been made at 6889-95 feet, corresponding to one of the sands in the pool.

Texas Conservative Oil Company's Flynn 5-B, in the South Clara Driscoll field of Nueces County, logged sands at 5820-26 feet and 5880-90 feet in drilling to 6000 feet. Sidewall samples indicate possible production. These are considered new lenses for the area.

Second for Duck Bay

Coronado Corporation's second well in Duck Bay field, Calhoun County, has been brought in flowing at the rate of 70 barrels of clean oil per day through 3/32-inch choke under 1030 pounds tubing and 1370 pounds casing pressures. Perforations had been made at 5660-61 feet. The well is southeast of the discovery and marks the trend of this producing area.

Lolita field's third sand level was definitely established through completion of Magnolia Petroleum Company's Mitchell 3, which on a potential test flowed 270 barrels of clean oil through 11/64-inch choke. The well had pressure of 650 pounds on tubing. Completion was through perforations at 5271-77 feet in a Marginulina sand.

Magnolia Petroleum Company had another Jackson County discovery, this being Nannie B. West 105-A, which was testing through perforations at 6104-10 feet. It was making considerable oil and gas, but not definitely gauged. The test is opening the deepest sand in the West Ranch field.

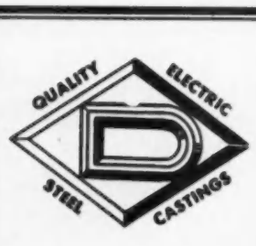
Flowing 98 percent salt water on a production test at 8554-88 feet, Gulf Board Oil Corporation et al failed in an attempt to open a new submerged field on the Mud Island prospect in Aransas Bay, Aransas County. The well had shown considerable oil in the sand, but final completion was not successful. It was being drilled ahead to the 10,000-foot contract.

Earl Callaway set casing through a sand at 4863-75 feet encountered in M. W. Smith 1, ½ mile east of the Ben Bont field production in Jim Wells County. The hole has been carried to 5600 feet then plugged back to test the higher sand. It may be opening a new sand for the field, as well as providing an extension.

Henshaw Brothers failed to find the oil sand in Boerner 1, 660-foot northwest offset to the discovery and only producer in the Henshaw field of Jim Wells County. The well was drilled to 5885 feet, then plugged back to be completed as a gas producer at a higher level.

H. R. Smith, Inc.'s Koehler will be completed as a gas producer in sand at 5049-68 feet as soon as title work is completed. The well had been drilled to 5800 feet but failed to find lower sands. The Frio sand gas well will open a new pool in the Casa Blanca Grant, three miles east of Orange Grove.

A small oil showing in the Govern-



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ment Wells zone at 1109-21 feet in J. P. Taylor's T. A. Vernor 1, may indicate a new oil field 2½ miles southeast of Calliham and just east of the McMullen County line in Live Oak County. The well was being carried ahead to test the Mirando zone around 1200 feet. The wildcat is in a 1182-acre tract in the John Turner survey.

Potential test on Ike Howeth's discovery of a new field four miles east of Loma Novia production in Duval County rates the well at 38 barrels per day of 29.2-gravity oil on swab. It was being completed on pump. The test was completed through perforations at 3249-3258 feet. This wildcat, in I&GN Survey No. 68, is on a 2000-acre block.

Falfurrias Wildcat

West Production Company's Ehlers 1, wildcat six miles northeast of Falfurrias, Brooks County, encountered another sand which on drill-stem tests gave encouragement. The newest sand is near the top of the Vicksburg. The well, however, was drilling below 8810 feet, apparently to go to at least 10,000 feet. A drill-stem test at 7749-7800 feet, tool open 30 minutes, built up a maximum pressure of 30 pounds, top hole; closed 8 minutes, bottom-hole pressure was registered at 2840 pounds. The mud was heavy and a new test was run at the identical level. This time, it flowed salt water in 19 minutes under 102 pounds pressure. Open 26 minutes, the maximum pressure reached 400 pounds with bottom-hole pressure 3185 pounds. Another test at 7789-7800 feet failed.

Royal Oil & Gas Company's Yturria 1-A, Lot 4, Royal subdivision, has been given a final test. It has opened the Nichols pool nearly two miles east of the Samfordyce area in Hidalgo County. In 24 hours, it made approximately 75 barrels of 28.4-gravity pipe line oil through ⅛-inch choke, pressures 925 pounds on tubing and 1350 pounds on casing. Perforations had been made at 3497-3503 feet with 30 shots.

Sun Oil Company has given the north extension area of the North Rincon pool, Starr County, assurance of a second producer, this one being in a new sand. Mateo Sanez-State 2, 1716 feet north of the first well, cored the section at 4393-4402 feet. On a drill-stem test of the same, the recovery included 500 feet of oil and oil-cut mud under 72 pounds working pressure in 17 minutes. Closed-in bottom-hole pressure was 1810 pounds. It was going ahead.

W. R. Davis & Company's Seyfriedt 1, 1646 feet east of the discovery of the Yzaguirre field, drilled to 6006 feet and was due to make a series of tests up the hole.

Pan American Production Corporation had made another location on the Willamar prospect in Willacy County, where the company apparently is opening a new field. The new well is to be Willamar Community 1-B, Caricitos Grant, 1015 feet south and east of Garcia 1. The present well is being tested in sand at 7698-7710 feet.

A new shallow pool in the Austin chalk will be attempted by H. G. Dickinson in C. V. Adamek 2, six miles south of Taylor in Williamson County. The well, in the BBB&C Survey, topped the chalk at 820 feet and was drilled in 40 feet, casing being set atop the zone. This is the second well drilled on the prospect.

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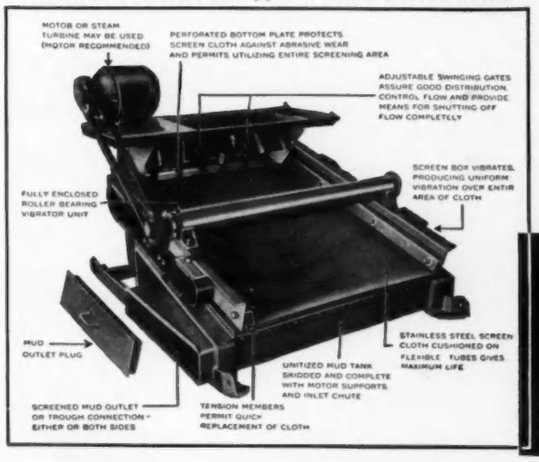
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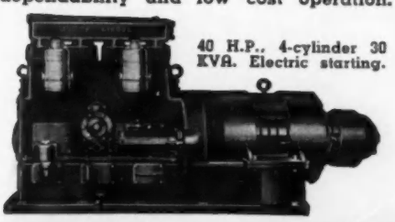

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Texas Gulf Coast

Fishers Reef Wildcat May Make Hackberry Well

Humble Oil & Refining Company will test State C-2, wildcat on tract 46, Fishers Reef prospect, Trinity Bay, Chambers County, with prospects of making a well in the Hackberry zone of the Lower Frio. Casing was set at 9005 feet for tests in the lower part of the hole. The wildcat, fourth and most northerly for the prospect, logged several gas and distillate shows in this section, which last May indicated production in Standard Oil Company of Texas-Salt Dome Oil Corporation's State 61-54. Latter test yielded side-wall samples and electrolog indications in a number of zones at 8992-9028 feet, showing from 2 to 8 percent by volume gas and oil, with the operators later drilling State 1-66, a failure. Humble Oil & Refining Company recently abandoned State C-1-45, south of their current test. The prospect is one of a group of five obtained by early torsion balance work in the bay and on the bay shores. Of the others, Cedar Point, South Cotton Lake, and Caplen have been converted, while Angleton Grove is partially condemned by a dry hole. The strike, if made, will be thirteenth for the upper coastal sector in 1940, and the second entirely marine field for Texas.

Other marine activity, with the exception of a blown-down derrick at Hall-Jordan Oil Company's State 1-72, Jefferson County, was routine. On this test of the Gulf of Mexico prospect, near Sabine Pass, drill stem stuck at 8000 feet. Pipe had been stuck before in this hole, forcing side-tracking. Shell Oil Company's State 1-199, Umbrella Point wildcat in Galveston Bay, was below 10,000 feet with no shows reported. Gulf Oil Corporation's State 1-R-244, offset to discovery at Red Fish Reef, spudded and set surface pipe, but will wait on drilling of water well. Humble Oil & Refining Company's State 3-A-248 was drilling at 10,207 feet in shale; State 4-A-203 was drilling at 7669 feet in shale, and State 7-A-264 was at 3025 feet in shale.

Texas Gulf Producing Company's Moore 1, on the west edge of the Rowan field, Brazoria County, tested salt water in the 8500-foot regular pay, topped low at 8559 feet, and drilled to 8885 feet where coring for the 8900-foot horizon was begun. The latter level has not yet been definitely established as productive, as Rowan & Nichols and Texas Gulf Producing Company's Bradbury 1, 2200 feet east of the field discovery, made 5½ barrels distillate hourly on recompletion at 8980-85 feet, with 40 percent salt water flow, and was killed for the second time. Initially, the horizon produced 7 barrels hourly under 3200 pounds pressure. Humble Oil & Refining Company completed Hubbard 1, north outpost, for 7 barrels of distillate hourly through ⅛-inch choke from 8532-55 feet, with tubing pressure 1825 pounds, casing pressure 1625 pounds, and spudded and drilled Hubbard 2, offset, to 2412 feet.

Three More for Dyersdale

Dyersdale field, Harris County, registered three certain producers as H. C. Cockburn swabbed Burkett 4 and perforated Burkett 8 for production test, and J. M. English erected tanks to receive flow from Stewart 1, north edge test. Latter test looked like a deviation from normal when it topped the 4050-foot Frio pay at 4064 feet and encountered only 6 feet of broken sand, but apparently will make a satisfactory producer. Cockburn lost swab in Burkett 4, but continued to swab without retrieving the lost tool. McDannald Oil Company's Choate 1, 1200 feet northeast of the discovery on a Pure Oil Company farmout, was drilling near the sand. Moran Corporation's Ezzell 1, west edge, remained inactive.

Ogburn, Harris County, appeared in line for a new sand as L. M. Josey ran casing to 7181 feet in Fee 1, 2500 feet northwest of the 6900-foot production. Shows were encountered in hitherto untested sands at 7020 feet, 7130 feet and 7180 feet, with reservation for the possibility that the 7020-foot sand correlates with the 6900-foot level in the field. The 6500-foot sand producing in Walter Goldston's Josey 1, offset, was topped at 6654 feet, with a new section carrying 42-gravity distillate found at 6616 feet. The lower sections will be tested first.

O. C. Garvey will drill Meyer et al 1, 6500-foot Balcones fault zone test to the Wilcox in Lafayette County, 3 miles northeast of Fayetteville, J. Murphy Survey. Houston Drilling Company has the contract, and location is on a tract farmed by The Texas Company. Humble Oil & Refining Company spudded Melde 1, Rucker Survey, Lee County, and drilled past 3000 feet. This area is commonly called Tanglewood. On the Sugar Valley prospect, Matagorda County, Helmerich & Payne drilled Herman 1 to 9505 feet, plugged back to 7336 feet to side-track to first sand encountered in original hole, reportedly at 8073-91 feet. The Ohio Oil Company's Blackburn 1, same prospect, was coring at 8325 feet.

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Louisiana Gulf Coast

Jefferson Parish Wildcat Blows Out at 9900 Feet

In the Westwego area, south of New Orleans in Jefferson Parish, Titanic Oil Company's Marrerro Land Company 1, Section 2-13s-23e, blew out of control for a few hours, making oil and mud from 9900 feet. Operators installed control head to complete through drill stem, stuck on bottom at 9935 feet. The wildcat, on a farmout tract from Shell Oil Company, cored sand at 9320-30 feet, slight show oil, oil sand at 9790-9865 feet, and sand showing oil and gas at 9890-9926 feet, the probable blowout zone. Before control head was placed, the well flowed under control one hour, making oil, gas and mud. The prospect, commonly called Gretna, was discovered by Shell Oil Company with reflection seismograph in 1938-39, the company taking acreage along with Louisiana Land & Exploration Company and Stanolind Oil & Gas Company.

Probable establishment of a new field in the Franklin area, St. Mary Parish, was deferred as Bateman Drilling Company waited on cement in Foster 1, Section 38-15s-9e, with 7-inch casing set at 10,481 feet. Oil shows were found in cuttings at 1560-1640 feet and 1870-90 feet, and cores at 9350-58 feet, 9750-81 feet, 10,345-355 feet (confirmed by elec-

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trolog), 10,386-406 feet, 10,415-420 feet, and 10,425-430 feet. A gas sand was logged at 10,461-466 feet. Saturation in several of these zones varied from 5 to 8 percent and porosity from 27 to 30 percent. Test checked 500 feet high on regional normal, with a scarcity of previous tests in the large area bounded by Franklin, West Cote Blanche Bay, Wax Lake and Bayou Sale lending additional interest.

Development of the 8200-foot pay at Iowa, Calcasieu Parish, continued to eclipse activity at other 1940 field and sand discoveries. Magnolia Petroleum Company, discoverer, had Waite 15, workover, in the sand, and staked Waite 16, new hole in Section 12-9s-7w. Shell Oil Company's Heyd 32 was coring 500 feet below the sand, apparently the first well to miss the 8200-foot section. Sid Richardson drilled out of surface pipe in Sweet Lake Land & Oil Company 1, 2000-foot south extension. Barnsdall Oil Company started to deepen Fontenot 4, 6900-foot producer. Magnolia Petroleum Company's Waite 14 yielded a 365-barrel potential, lower than those typical of the previous three completions in the new sand.

Superior Oil Company may make its second flank-sand strike at Bayou Bouillion, St. Martin Parish, in as many weeks. St. Martin Land Company 1, 2-mile south extension attempt, was prepared for test of gas and distillate section cored at 7497-7507 feet, with casing set at 7544 feet. The company was building derrick for Rycade 4, offset to Rycade 3, close-in south flank completion which pumped 70 barrels of 22-gravity oil in 10 hours from 3305-15 feet. Company's Stewart et al 1, wildcat on Section 28 Dome, was drilling at 9390 feet, within a few feet of the depth record on this 23-year-old proven salt dome. The test is the seventeenth for the structure, frequently called Hager-Martin dome.

Gauge on The Texas Company's State-Cote Blanche 3, new deep sand discovery at West Cote Blanche, St. Mary Parish, was 534 barrels of 31.5-gravity oil daily from 9058-86 feet, via 12/64-inch choke, tubing pressure 1250 pounds. Each test drilled in this field since discovery last spring has opened a new sand. Field discovery flowed 25 barrels 23-gravity oil daily from 3109-36 feet, and the second test, State 2, flowed 239 barrels of 29-gravity oil daily from 4997-5018 feet.

W. T. Burton and Continental Oil Company were fishing for 1100 feet of drill pipe stuck in the hole by blowout at Mayo Realty Company 1, promising wildcat on South Lake Charles Prospect, Calcasieu Parish. The test, in Section 11-8s-11w, blew gas and distillate from 10,800 feet for 2 hours before sanding up, the zone being apparently the one which attempted to blow out several weeks ago, sticking drill stem and forcing a side-tracking job to get back to the sand.

Pan American Production Company's Laws Realty 1, deep test in the Charenton field, St. Mary Parish, perforated at 6780-6806 and 6830-50 feet for squeeze-cement job prior to test, with 5½-inch casing set 6900 feet.

A 1½-mile west extension was in prospect for the Neale field, Beauregard Parish, as Atlantic Refining Company set casing on bottom at 8380 feet in Rice Land & Lumber Company 1-C to test the 8300-foot sand which returned good cores. Apparently the extension test does not confirm the slight structural relief indicated by a completion ½-mile west of the discovery which topped the sand 20 feet low. The company's Musser-Davis 3 was perforated in the sand, while Musser-Davis 4 was drilled into the sand. Both tests are inside locations. This prominent 1940 discovery has been defined only on the east, where a dry 1-mile extension attempt topped the sand 120 feet low. Other completions have all found the pay at depths within a few feet of that in the discovery.

North Louisiana

East Central Section to Get Attention From Operators

Further exploration of the trend just south of the Angelina-Caldwell Flexure across central Louisiana, especially in the eastern part of the state, has been set off by developments in the Olla field, with over 60 oil wells producing from the shallow Wilcox, and the shallow Nebo (Jena) field, producing from the same horizon, though deeper, with 3 oil wells.

During the last week, Louark Producing Company sent two shooting units to a block of approximately 125,000 acres in Townships 4, 5 and 6 north, Ranges 3, 4 and 5 east, near the La Salle-Catahoula Parish line. This land is Tensas Delta Lumber Company fee and is under option to Louark Producing Company and Phillips Petroleum Company.

Sinclair Prairie Oil Company is negotiating with Goodpine Lumber Company for acreage in Township 8 north, Range 2 east, La Salle Parish, where it has several thousand acres already under lease. Fidelity Oil & Royalty Company secured 1115 acres from Urania Lumber Company, the acreage centering around Section 27-9n-1e, La-Salle Parish. The leases are for 10 years.

Shell Oil Company is negotiating with Frost Lumber Industries for a geophysical option on 50,000 acres around Section 5-6n-7w, Natchitoches Parish.

The Texas Company is renewing its leases in Townships 22 and 23 north, Range 10 west, Webster Parish, in the Shongaloo area where gas/distillate has been found in the Lower Marine.

Atlantic Refining Company will drill two additional wildcat tests in the Packton area of Winn Parish where it recently drilled a 3550-foot test that was abandoned. In the same parish, W. H. Rowe is leasing in Township 9 north, Range 6 west. Rowe discovered the Homer, Louisiana, oil field in 1919.

Farther west along the Angelina-Caldwell Flexure and in Grant Parish, Gholson & Hodge made location for a wildcat test, Chicago Mill and Lumber Company 1, C NE NE 16-7n-1e.

Another wildcat location in North Louisiana was Ed De Armand and associates' Elgin 1, SWc 8-20n-13w, Bossier Parish.

North Louisiana accounted for 22 new locations during the last week of which 11 were for new tests in the Olla field,

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LaSalle Parish. There were 19 completions in North Louisiana of which 13 were oil wells, 1 was a gas well, and 5 dry holes.

J. R. Glassell of Shreveport made location for a proposed 8500-foot semi-wildcat test on the southeast flank of the old shallow Pine Island field, Caddo Parish, at Fee 1, C SE 30-21n-14w. Several major companies have an interest in the test.

Arkansas

Drilling at Low Ebb; One Wildcat Start Announced

Drilling activity continued at a low ebb last week in Arkansas with only 19 drilling operations under way. Location for a wildcat test in St. Francis County was made by United States Oil Corporation at Johnson 1, NE NE 29-4-1. The test has spudded.

Two tests were drilling in the Magnolia field, Columbia County; one was drilling and one rigging at Buckner, Columbia County; two were drilling in the Dorcheat field, Columbia County; and one was drilling at McKamie, La-Fayette County.

Arkansas Permits

Four drilling permits were issued last week by the Arkansas Oil & Gas Commission, as follows: Columbia County—Louark Producing Company's A. W. Gunnels B-2, C NE NW 20-17-19; La-Fayette County—Normandie Oil Corporation's R. R. Cornelius 1, C NW SW 28-17-23; Union County—Fohs Oil Company and Pilgrim Exploration Company's C. T. Grace 5, NE SW SE 31-17-14, and Delta Drilling Company and A. V. Erwin's C. T. Grace 4, NW SE SE 31-17-14.

Mississippi

Wildcats Start in Attala Clark and Jeff Davis Counties

Three wildcat tests were announced last week in Mississippi, being located in Attala, Clarke and Jeff Davis counties.

In Attala County, Gulf Refining Company is rigging at L. L. Peeples 1, NEc 35-15n-9e. In Clarke County, W. H. Willsingham made location on a 5000-acre block for State 1, C SW NW NE 16-4n-15e, which has a 4000-foot contract depth. In Jeff Davis County, Sun Oil Company made location for Ed Taylor D-1, SE SW NE 32-6n-19w, for a core-hole test.

Harry I. Morgan of Shreveport, has secured a 7500-acre wildcat block in Stone County, with a proviso to start a test by next April 15. Part of the acreage is state-owned land.

In Monroe County, Alabama, a block of 37,000 acres has been acquired by Magnolia Petroleum Company, the acreage being in the southern part of the county. Humble Oil & Refining Company is reported to have secured 680,000 acres of leases in Conecuh, Covington, Escambia and Monroe counties, Alabama, from Westbrook, Thompson and Stewart.

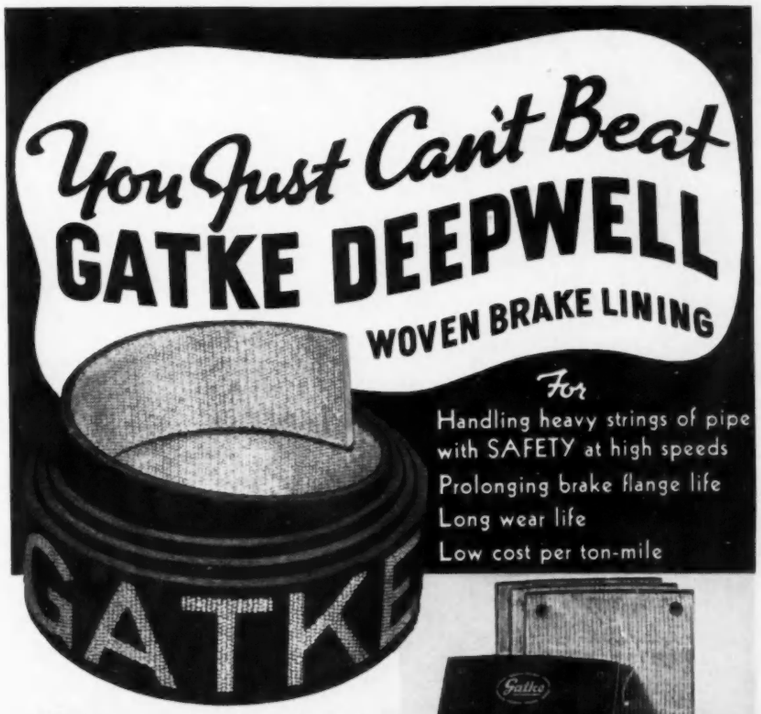
Rocky Mountain Area

Deepening Efforts Continue With Encouraging Results

Deepening campaign now underway to develop the lower Tensleep (Pennsylvanian) sands in the southwestern Wyoming district received another boost last week when an initial test showed for 838 barrels of oil in 15½ hours from Sinclair-Wyoming Oil Company's Mahoney F-3, SE NW 34-26n-88w, in the Mahoney Dome field, Carbon County. The well was one of the first to complete commercially in the Tensleep levels of the field early in 1939, and was the first to be carried ahead to the base of the horizon for further testing. Present depth is 4505 feet, in the lower sections of the Tensleep formation.

Latest well in the Lost Soldier field, Sweetwater County, to be deepened under the deep Pennsylvanian sand development program, Sinclair-Wyoming Oil Company's Lost Soldier 77-A, SE NE NE 10-26n-90w, showed for 953 barrels of oil in 24 hours, 16 hours on gas lift, in preliminary tests at a new depth of 4285 feet. Original completion a number of years ago at 4049 feet was in the upper Tensleep section.

Extensions to the proved field areas in a number of Rocky Mountain pools continue. Ohio Oil Company's State 9, NW SW NW 36-36n-65w, ½ mile east of production in the Lance Creek field, made 315 barrels of oil per day from



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the Sundance (Jurassic) beds which had been drilled to 4468 feet. Location is ¼ mile south of State 8 which was the first Sundance well to drill in this sector of the field, and which proved the existence of a commercial pool in this horizon on the eastern flank of the Lance Creek field proper.

Indications that the newest well to drill in on the jointly operated Wilson Creek field in Moffat County, Colorado, may make the largest producer to date for that district are seen in preliminary tests showing a production of from 20 to 30 barrels of oil per hour in The Texas Company and the California Company's Unit 4, SWC SW 2-2n-94w, 1 mile south of production. The well is testing saturation encountered in the Morrison formations at 6604 feet after plugging back from water-bearing Sundance formations at around 6800 feet. This will nearly double the proven area of the pool if successfully completed.

Northern extension test of the Frannie field in northwestern Wyoming, Continental Oil Company's Prigge 1, SE SE SE 33-9s-25e, on the Carbon County, Montana side of the field, is still testing at 3562 feet. Two offset locations have been spotted, but operators are waiting on results of this test before starting additional activity in this part of the field.

Hearings Postponed

The Texas Railroad Commission has postponed indefinitely its hearing on an application for an increase in the allowable for the Wasson field.

The commission also postponed to November 27 a hearing to fix operating rules for the Grossman field, Jim Wells County.

Michigan

Fishing Jobs Delay Wildcats; Operations at New Low

Fishing jobs delayed completion of two closely watched wildcats in the Michigan basin, while completed operations dropped to a new low for the year. Only 16 completions were reported, and only two new wildcat starts were announced.

Considered a key test because of its relative high structural position, drill-in plans were indefinitely delayed on Rowmor & Hughes' Wyman 1, Section 29-20n-6w, Clare County, when swab was lost at 379 feet. Test had been cased on the Dundee dolomite at 3768 feet and 5-inch cemented. Operators planned to unscrew pipe below the swab and attempt recovery after fishing operations were unsuccessful over a 72-hour period.

Richard Erlewine, Trustee's Sams 1, Section 9-13n-9w, Mecosta County, cased 5-inch at 3575 feet and lost cable tools when the line parted at 3591 feet after logging a show of gas.

H. L. Gentry Engineering Company's Wilson 1, NW NW NE 29-1n-13w, Trowbridge Township, Allegan County, flowed 12 barrels per hour after acid from Traverse limestone at 1384 feet. It was the first flowing well ever completed in the township and gives promise of another shallow play flurry. Test was not a wildcat, as several small producers, ranging from 5 to 25 barrels per day, have been completed in the same district over the past two years.

Two more shallow Traverse lime failures in Bloomfield Township, Huron County, practically ended development for a 1400-foot pay, started two months ago when Cryden Oil Company's McDonald 1, section 20-17n-14e, wildcat, flowed 120 barrels natural from 1427 feet. However, McDonald 1 went dead in less than a week and attempts to establish commercial production since have not been successful. After two nitro shots, it swabbed 8 barrels of oil and 32 barrels of water. One of the failures out of five follow-up starts was a west offset.

Sun Oil Company was drilling below 4772 feet on Kidder 1, Section 8-3n-9w, Barry County, a wildcat, without logging oil or gas shows in the Trenton objective. Top of the Trenton was logged at 4387 feet. Test is the first during the 1938-40 shallow drilling campaign in Southwestern Michigan to be carried to the Trenton.

Possibility of a 2-state oil field in the 600-700 foot Traverse beds appeared less remote this week as the third test in the Cass County play developed considerable water with oil. The play is just across the Ohio state line into Michigan. Three tests to date have pumped from 5 to 30 barrels of oil, but cut water from 20 to 50 percent.

California

Wildcats Staked in Humboldt And San Joaquin Counties

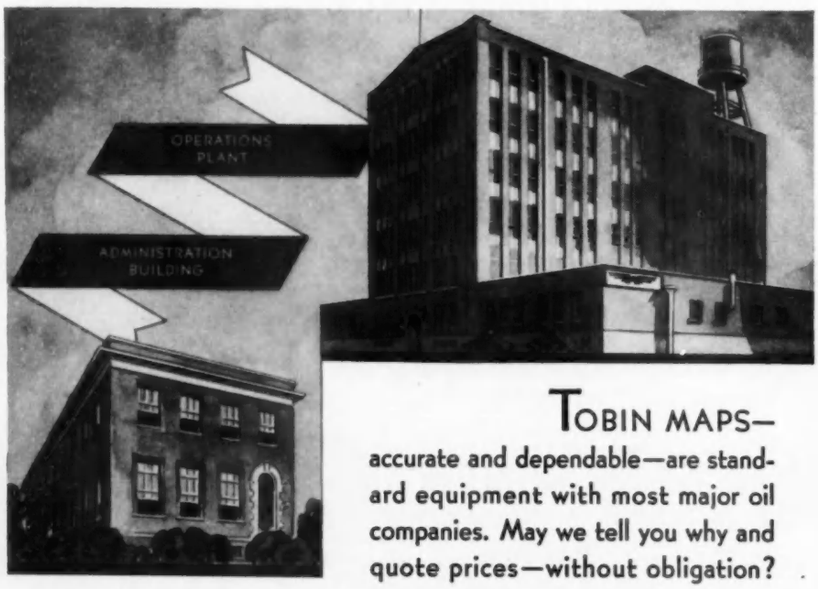
In the Southeast Tracy area of San Joaquin County, Standard Oil Company of California has leased upwards of 6000 acres and has staked location for a gas test, Blewett 1, in Section 25-3-6. The location is 10 miles southeast of Tracy and northeast of Union Oil Company's Tracy 1, wildcat which was bottomed at 5510 feet.

In North California, Humboldt County, Amalgamated Oil & Gas Company has concluded negotiations for leases on 10,900 acres and will drill a gas test in Section 2-1-2. Location is 15 miles southeast of The Texas Company's gas wells at Eureka.

Continental Oil Company is abandoning Kreyenhagen 1, wildcat in Section 4-22-6, Jacalitos Hills area, Fresno County, which cored to 11,020 feet where it was bottomed in siltstone. No showings of importance were encountered. Top of Domengine was placed at 9402 feet, and the Kreyenhagen at 8430 feet.

Superior Oil Company has reported showings of heavy oil on the ditch at intervals below 6100 feet in Tar Springs 1, wildcat in the Huasna area, San Luis Obispo County, Section 24-32-14. It was drilling and spot-coring below 6302 feet. In this same area, Tex-Harvey Oil Corporation's Gilmore Community 1, Section 11-32-14, recovered five stands of mud on formation test at 3350-90 feet, and was preparing to drill ahead.

Kern Line Oil Company obtained a show of oil, but not in commercial quantities in its wildcat, Section 19-11-19, Grapevine-Wheeler Ridge area of Kern County. The test cored a few stringers of oil sand between 7120 and 7145 feet, but formation was reported as hard gray sandy shale. It was being deepened in shale at 7235 feet.



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Longview
Marshall
McCamey
Mexia
Midland
Mineral Wells
Nocona
Odessa
Olney
Pampa
Seagraves
Tyler
Wichita Falls

UTAH
Salt Lake City

WYOMING
Casper
Glenrock
Greybull
Lovell
Lusk
Medicine Bow
Rawlins
Thermopolis
Worland

UNITED STATES WELL COMPLETIONS

Arkansas

Company, Well and Location	Init. Prod. Bbls.	Depth
Union County (Urbana)—		
McCreslenn Oil Co., Howe 1, 3-18-13	60	3534

California

Company, Well and Location	Init. Prod. Bbls.	Depth
Fresno County (Coalinga Northeast)—		
Standard, 77-7B	2558	8200
Texas, Kimberlin 2	600	8218
Wilshire Annex Oil Co., 52-30B	845	8250
Fresno County (East Coalinga Eocene)—		
Standard, 7-17F	1004	7930
Kern County (Belridge)—		
Belridge Oil Co., No. 8-1	75	8217
Kern County (Coles Levee)—		
Richfield, KCL-A 54-29	440	9440
KCL-B 81-31	1208	8980
Standard, KCL 20-7	367	9410
Kern County (Devils Den Area)—		
Seaboard Oil, Beer 66	...	8821
Kern County (Mount Poso)—		
A. T. Yeager, Mudroch 3	40	1680
Kern County (Paloma)—		
Ohio Oil, KCL-B 3-23-3	1364	10288
Kern County (Ten Sections)—		
Shell, KCL a-83-30	2298	8235
Los Angeles County (Montebello)—		
Kern Oil Co., Monterey 28	114	7554
Los Angeles County (Rosecrans-Athens)—		
St. Anthony Oil Corp., Gordon 2	1250	7953
Los Angeles County (Seal Beach)—		
Continental, Bixby 25	193	4775
Los Angeles County (Wilmington)—		
Long Beach Oil Dev. Co., "W" 18	314	4064
Richfield, Pacific Dock 19	184	3140
Union Pacific, UP 153	140	5523
Wilton Oil Co., Community 7	120	3710
Orange County (East Coyote)—		
Bartholomae Oil Corp., Stern 3-A	392	6880
F. E. Fairfield, Tuffree 1	75	2137
Standard, Coyote 2-14	658	6881
Orange County (Huntington Beach)—		
Signal O. & G. Co., Signal Bolsa 13A	1500	4625
Ventura County (San Miguelito-Padre Canyon)—		
General Petroleum, Padre 3	422	5181
Ventura County (Shiells Canyon)—		
O. C. Field Gasoline Co., Calumet B-3	120	2687
Temulac Oil Co., Calumet 7	45	3148
Ventura County (Ventura Avenue)—		
Shell, Taylor 126	158	6950
Tide Water, Lloyd 70	120	7785

*Failures; †Junked; ¶Million cu. ft. gas.

Colorado

Company, Well and Location	Init. Prod. Bbls.	Depth
Fremont County (Florence)—		
T. E. Maloney, Slevins 264, ne sw 34-19s-69w	3	1850

Illinois

Company, Well and Location	Init. Prod. Bbls.	Depth
Bond County—		
Magnolia, Griggs 5, se se ne 9-6n-2w	75	1015
Arrow Dr. Co., Spindler 3, nw sw nw 10-6n-2w	52	1018
Clinton County—		
Gulf, Buehler 3, ne se ne nw 12-1n-1w	gas inp.	1387
Max Pray, Bramier 2, se c sw 2-1n-2w	12	1322
Reeves & Raemer, Knolhoff 1, nw sw sw ne 11-1n-2w	*	1332
Morgan, Hood 4, ne c sw sw 35-2n-1w	48	1375
L. G. Miller, Schmidt 1, ne sw se 35-2n-5w	*	2295
Ed Self et al, Reis 1, e½ se nw 34-3n-1w	*	1431
Edwards County—		
Continental, Stafford 1, se se ne 13-2s-10e	658	3215
Stafford 2, ne se ne 13-2s-10e	783	3243
Jarvis Bros., Wicke 2-A, c s½ se ne 24-2s-10e	86	3225
Superior, Works 7, nw sw nw 18-2s-11e	210	3150
Works 8, nw nw sw 18-2s-11e	2400	3174
Fayette County—		
Texas, Yakel 13, ne nw se 6-6n-3e	189	1572
Sell 1, ne ne sw 7-6n-3e	*	1635
Magnolia, Clow 22, se se nw 5-7n-3e	210	1548
Central States, Owens 5, se ne se 8-7n-3e	22	1578
Carter, St. Pierre 1-3 swc ne nw 1-8n-3e	gas inp.	1547
Taylor 12-6, nwc nw se 12-8n-3e	gas inp.	1535
Trullinger 15-1, nwc nw nw 15-8n-3e	gas inp.	1601
Bennett 4, nw sw nw 29-8n-2e	186	1512
Smith 2, ne nw se 35-9n-3e	48	1542
Franklin County—		
Trares, Downen 1, sw nw sw 26-7s-4e	*	3455
Benedum-Trees, Chenault 1, se se se 27-7s-4e	267	3118
Manley et al, Marvel 1, ne ne ne 34-7s-4e	500	3117
Gallatin County—		
Roy Powers et al, West 1, sw nw se 28-7s-8e	*	2955
Fields, Logan 2, sw sw se 17-9s-9e	*	1820
Hamilton County—		
Exchange Oil & McBride, Life Ins. 1, ne se ne 35-5s-6e	*	3305
Hinkle et al, L&N RR 2, e½ se ne 34-5s-6e	100	2973
Gulf, Morris 3, ne nw nw ne 34-5s-7e	185	3022
Jasper County—		
Pure, Dickerson 1, c e½ ne nw 20-5n-10e	631	2810
Wagoner 2, nw sw nw 16-6n-10e	1304	2790
Connor & Arnold, Swick 1, se nw ne 17-6n-10e	*	2901
Johnson Oil, Hunt 1 c e½ se ne 17-8n-10e	3	2607
Marion County—		
Paul Jones, Fyke 1, sw ne sw nw 32-2n-1e	*	1200
Shell, Verbers 6-C c e½ se nw 18-3n-1e	163	4100
Booth & Absher, McMackin 7, ne nw sw sw 34-3n-2e	sw dis.	1568
Johnson et al, Johnson 2, n½ nw nw 32-1n-1e	*	2185
Ohio, Murray 20, c w½ nw se 7-1n-2e	62	3500
Texas, Farthing 20, sw nw ne nw 4-1n-2e	112	3520
Friedrich 22, sw ne se sw 6-1n-2e	56	3496
Fyke 19, w½ ne sw 8-1n-2e	56	3525
Montgomery County—		
Algona, Wagoner 2, se sw sw 29-11n-5w	¶ 0.1	555
Wabash County—		
Cecil Keneipp, Smith Hrs. 1, sw c se 15-1n-12w	*	2325
O'Meara, Harris 1, nw sw nw se 17-1s-12w	75	2038
Continental, Seiler 1, sw sw ne 34-1s-13w	62	2681
Dague 2, e½ se ne nw 20-2s-13w	9	1785
W. W. Gray, Fee 6, ne nw sw se 14-3s-14w	330	2514
Fee 8, nw nw se 15-3s-14w	90	1822
W. C. McBride, Hon 1, sw se sw 33-3s-14w	77	2905
Wayne County—		
Pure, Feller 1, sw nw se nw 5-1n-8e	567	3100
Johnson 1, w½ nw ne 8-1n-8e	578	3100
Stanford 1, c w½ se sw 36-2n-7e	309	3070
Hasselton 3, c n½ sw sw 28-2n-8e	28	3045
Huble 1, e½ ne sw 32-2n-8e	430	3100
Oil Well Dr. Co., Hilliard 4, c s½ ne nw 34-1s-7e	117	3302
Robinson et al, Feliz 2, sw ne sw 26-2s-8e	150	3438
M. I. OU., French 1, e½ se se 4-3s-8e	248	3496

[*Continued on next page*]

Summary of Drilling Operations in the United States, Week Ended November 9, 1940

	WELLS COMPLETED							*PERMITS FOR NEW WELLS				
	Completions	Oil Wells	Gas Wells	Failures	Initial Production	Total 1940	Total this Date 1939	This Week	Total this Month	Total 1940	Total this Date 1939	Year Total 1939
Alabama	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Arizona	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Arkansas	1	1	.....	.....	60	160	201	4	4	133	202	223
California	28	27	.....	1	16,604	975	934	15	15	976	944	1,174
Colorado	1	1	.....	.....	3	8	19	.....	.....	.....	.....	.....
Florida	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Georgia	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Illinois*	73	53	5	15	13,335	3,480	3,296	54	54	3,942	303	893
Indiana	14	7	1	6	953	443	229	.....	.....	.....	.....	.....
Kansas	37	31	.....	6	36,100	1,736	1,254	36	36	1,782	1,367	1,583
Kentucky	14	9	1	4	409	318	570	.....	.....	.....	.....	.....
Louisiana	39	26	2	11	5,347	1,481	971	48	48	1,450	1,228	1,449
Michigan	16	7	.....	9	398	1,054	1,291	14	14	993	1,276	1,419
Mississippi	4	3	.....	1	695	161	12	.....	.....	.....	.....	.....
Missouri	.....	.....	.....	.....	.....	.....	.....	2	2	24	.....	.....
Montana	4	4	.....	.....	352	171	125	.....	.....	.....	.....	.....
Nebraska	1	.....	.....	1	.....	28	1	2	2	48	.....	.....
New Mexico*	16	13	1	2	2,801	571	576	8	8	503	213	293
New York	14	13	.....	1	29	863	536	.....	.....	.....	.....	.....
North Dakota	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ohio	50	14	28	8	175	926	848	.....	.....	.....	.....	.....
Oklahoma	43	25	6	12	9,247	1,842	1,795	48	48	1,603	1,803	2,059
Pennsylvania	31	18	9	4	85	3,080	1,336	.....	.....	.....	.....	.....
South Dakota	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tennessee	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Texas	198	134	5	59	74,344	8,666	8,354	116	116	9,738	8,985	10,269
Utah	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
West Virginia	25	5	13	7	22	534	484	.....	.....	.....	.....	.....
Wyoming	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total this week	609	391	71	147	160,959	26,497	22,832	347	347	21,487	16,321	20,080
Total last week	586	371	80	135	168,241	26,076	22,432	608	2,455	21,140	16,293	20,080
Total this year	26,685	19,211	1,650	5,824	9,282,256	.....	.....	.....	.....	.....	.....	.....

* This tabulation includes those states where weekly data are available; figures for Illinois date from October 15, 1939; New Mexico from August 1, 1939.
† Includes water-input wells.

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United States Well Completions—*Continued*

ILLINOIS—Continued

Company, Well and Location	Init. Prod. Bbls.	Depth
White County—		
Magnolia, Cox 1, se se se 5-4s-14w	314	2956
Bond 1, se nw se 8-4s-14w	202	2714
Orient Dr. Co., Morgan 1, c n½ sw se 21-3s-8e	*	3539
R. Hal Compton, Potter 4, nw ne se 8-4s-14w	230	2695
Herndon Dr. Co., Bond 1, se sw ne 8-4s-14w	150	2695
Wm. Spellisy et al, Hon 1, sw se sw 9-4s-14w	192	2845
Cherry & Kidd, Calvin 2, nw se ne 8-4s-14w	92	2709
Gray 2, nw sw se 8-4s-14w	80	2719
Gray 1, ne nw ne 17-4s-14w	70	2710
Pure, Calvin 2, nw nw nw 16-4s-14w	150	2844
Superior, Ford 1, sw sw nw 23-4s-14w	126	2957
Collins 1, ne se nw 33-4s-14w	84	2919
Sun, Greathouse 18, ne ne sw 33-4s-14w	156	3018
W. M. Angle, Myers 1, c w½ nw ne 5-5s-9e	*	3375
Exchange, Angle-Storms 6, nw ne ne 22-6s-9e	10	2262

Indiana

Company, Well and Location	Init. Prod. Bbls.	Depth
Gibson County—		
K. T. & F. Oil Dev., Schoultz 1, nw ne ne se 18-1s-9w	*	1791
Walter J. Whitcomb, Mead 1, sec sw 12-1s-10w	*	1543
Consolidated Oil, Maxan 1, ne ne ne 17-2s-10w	*	1515
Joe Bander et al, Cooper 8, ne sw ne 13-3s-14w	175	2502
Hall Edwards, Rec., Maier 2, ne se ne 14-3s-14w	200	2860
Knox County—		
W. C. McBride, Metropolitan Life Ins. 1, nw se se nw 24-2n-11w	161	1913
Winkler 2, sw ne sw sw 24-2n-11w	*	1918
D. Miller Prod. Co., Sanneman 2, se nw se sw 24-2n-11w	*	1906
Newton County—		
Vaughan & Smith, Yacuk 1, sw c se se 33-32n-8w	*	880
Posey County—		
Somers & Egan, Keck 7, se ne ne 34-3e-14w	50	2526
W. C. McBride, Swonders 2, se ne nw ne 4-4s-14w	250	2807
Gulf Ref., Lang 5, ne ne ne 7-6s-12w	37	1147
Basin Dr. Co., Oakland City College 1, se se nw 16-8s-14w	80	2687
Spencer County—		
W. W. Dameron et al, Boyd 4, se sw se 30-7s-6w	¶6.701	937

Kansas

Company, Well and Location	Init. Prod. Bbls.	Depth
Barton County—		
Johnston et al, Oeser 1, c e½ ne sw 30-16-11w	328	3025
Texas, Disque 5, nw se sw 3-17-11w	927	3367
Brown, et al, Wolf 1, c e½ se 36-19-12w	25	3370
Butler County—		
Mohawk, Schaffer 1, se nw se 4-27-6e	*	3148
Ellis County—		
Bishop, Walters 1, c s½ sw ne 2-12-18w	*	3710
Ellsworth County—		
Magnolia, Horesji 1, c w½ nw nw 17-16-10w	79	3378
Schoreder 3, c e½ sw sw 26-16-10w	3000	3295
Aylward, Ehler 1, sw ne sw 35-16-10w	2753	3314
Lario, Mehl 5, c s½ nw se 35-16-10w	3000	3300
Lauck-Moncrief, Meyer 3, sw ne nw 35-16-10w	3000	3325
Continental et al, Rolfs 5, csl se ne ne 28-17-8w	478	3235
Pryor & Lockhart, Strattman 5, c s½ se ne 2-17-10w	408	3299
Greenwood County—		
McKnab et al, Hess 1, nec nw 5-22-11e	*	2131
Houston, Berry 9, se sw ne sw 28-23-13e	30	1736
Kingman County—		
Skelly, Interurban 5, c w½ sw sw 30-27-10w	711	3484
Marion County—		
Larieux et al, Belton 1, sec ne 30-17-4e	15	2417
Mitchell County—		
Carter, Stratigraphic Test 2, sec sw 20-9-7w	*	3730
Pratt County—		
Skelly, Goyer 1, c s½ 8-28-11w	419	4245
Reno County—		
Ohio, VanSickle 2, sw se nw 23-23-4w (OTD 4621)	269	3573
Landon, Union Central Life 1, swc 7-24-10w (OTD 3773)	317	3798
Rice County—		
Skelly, Bernsdorf "C" 1, c s½ se ne 27-19-10w	sw dis	3310
Sharon, Tappan 1, c w½ nw ne 10-20-9w	145	3240
Vickers, Rose 1, c n½ ne sw 20-20-10w	1057	3299
Rooks County—		
Gulf, Bruton 1, c e½ se ne 23-8-17w	*	3483
Cities Service, Ruell 2, c s½ ne sw 10-9-16w	25	3430
Broadview, Livengood 8, c n½ nw nw 11-9-16w	2057	3236
Russell County—		
Cities Service, Graham 3, c n½ sw nw 28-14-13w	718	3164
Skelly, Reln 6, cel ne sw sw 25-14-14w	1277	2998
Wakefield, Neidenthal 2, c e½ ne nw 13-14-15w	851	3038
Shields, Rogg 4, c s½ se nw 9-15-13w	228	3043
Stafford County—		
Champlin, Smith "B" 4, sw nw ne se 17-21-11w	1942	3396
Republic Natural, McNickle 1, c w½ sw ne 2-24-11w	15	3725
Transwestern, Banker "C" 2, c w½ nw se 10-24-11w	3000	3819
Sinclair-Prairie, Krey 7, sw nw ne 14-24-11w (OTD 3799)	3000	3831
Stanolind, Martin 6, c w½ ne nw 14-24-11w (OTD 3801)	3000	3833
O'Conner 1, c w½ sw nw 14-24-12w	3000	3845
Woodson County—		
Aikman et al, Massey 6, ne nw se 25-23-14e	25	1638

Kentucky

Company, Well and Location	Init. Prod. Bbls.	Depth
Butler County—		
Cumberland Pet., Brown 1	10	423
Daviess County—		
Ohio Oil, Coombs 6	60	1272
Stewart & Snyder, Exell 5	150	1275
Cane Run Pet., Jackson 16	6	686
Grayson County—		
Litchfield O&G, Dinwiddie 2	*	1040
Dinwiddie 4	¶ 0.3	1127
Henderson County—		
O. J. Connell, Busby 2	100	1515
McLean County—		
Kaufman & Bolinger, Butterfield 1	56	1089
Ohio County—		
Producers Pipe Line, Hardin Hrs. 4	2	1504
Rex Pyramid Oil, Jolly 1	10	1053
E. J. Corless, Hoover 1	*	345
J. C. Miller, Whittler 6	15	387
J. C. Ellis, Greer 4	*	1278
Globe O&G, Kelly Hrs. 4	*	589

South Louisiana

Company, Well and Location	Init. Prod. Bbls.	Depth
Anse La Butte—		
Dyer, Corona 1	*	3825
Bayou Blue—		
Superior, Schwing 5	170	6133
Bayou Bouillion—		
Superior Rycade 3	75	4924
Belle Chasse—		
California, Delta Minerals 1-7	257	10,187
Chacahoula—		
Sun, Cypress 2	16	9569
Cheneyville—		
Amerada, Well 14	245	5715
Fausse Point—		
Sun, Kling & Walet 8	*	1342
Golden Meadows—		
Tippett, Doucet 2	126	5495
Gueydan—		
Fohs, Mulvey Irr. Co. 1	¶1.7	9961
Hackberry—		
Gulf, Erwin 27	*	7354
Iowa—		
Magnolia, Waite 14	365	8439
Lake Pelto—		
Texaco, State 34	*	7691
New Iberia—		
Texaco, Decuir 2	403	6476
Valentine—		
C&I Dr. Co.-Mohawk, Dousson 3	245	6962
Vermilion Bay—		
Texas, B-4 State	388	10,818
Ville Platte—		
Danciger, Pitre 1	245	10,231
West Cote Blanche—		
Texas, State 3	534	9103
West Lake Verrett—		
Shell St. Martin Ld. Co. 1	235	....
East Baton Rouge Parish—		
F.W.D. Oil Co., Aldrich & Hart 1	*	7501
Livingston Parish—		
Humble, Great So. Lumber Co. 1-B.	*	9406

North Louisiana

Company, Well and Location	Init. Prod. Bbls.	Depth
Bossier Parish (Sligo)—		
Triangle Dr. Co., Chatman 4, 18-17n-11w	400	3115
Caddo Parish (Pine Island)—		
E. W. McGoldrick, Muslow 10, 32-21n-15w	50	1515
Red Bank Oil Co., Woolbert 1, 26-21n-15w	8	1520
W. H. Tyson & A. D. Dodd, Muslow 3, 31-21n-15w	50	1595
Blaylock & Strange, Noel Est. 1, 15-20n-15w	*	2210
Louisiana Oil Prod. Co., Muslow B-5, 5-20n-15w	105	1504
Midfield Oil Co., Muslow C-3 5-20n-15w	150	1516
Claiborne Parish (Lisbon)—		
Olson Dr. Co., Patton Est. A-1, 30-21n-4w	*	5743
T. L. James & Co., Inc., Lowery Est. 1, 14-20-5w	*	5522
De Soto Parish (Wildcat)—		
R. C. Swails et al, Jackson 1, 36-12n-14w	*	2078
La Salle Parish (Olla)—		
A. C. Hope & C. L. Thompson, La. Central Lbr. Co. 1, 25-11n-2e	*	3918
H. L. Hunt, Urania Lbr. Co. 2, 25-10n-2e	160	2380
Placid Oil Co, et al, Hopkins Unit 1, 24-10n-2e	220	2384
La. Cent. Lbr. Co. 38, 36-10n-2e	130	2400
La. Cent. Lbr. Co. 50, 35-10n-2e	75	2425
La. Cent. Lbr. Co. 57, 35-10n-2e	90	2402
Ouachita Parish (Monroe)—		
United Carbon Co., Spade Fee 6, 6-18n-4e	¶ 7.0	2141
Sabine Parish (Converse)—		
J. D. Haynes, Frost Lbr. Industries 2, 17-9n-13w	30	1630
Webster Parish (Cotton Valley)—		
Hunt Oil Co., Jordan et al 2, 31-21n-10w	575	8645

Michigan

Company, Well and Location	Init. Prod. Bbls.	Depth
Allegan County—		
Alfred R. Urion, Goldsmith 1, c e½ ne se 2-3n-14w	*	1630
W. L. McClanahan, Lubbers 1, c nw ne 16-4n-14w	*	1625
A. E. Koprasch Klingenburg 1, ne se nw 21-4n-14w	10	1571
Gordon Oil Co., Slotman 2, ne nw ne 21-4n-14w	*	1602
H. C. William, Vander Kolk 2, nw sw ne 21-4n-14w	15	1698
John McClean, Bredweig 1, ne se sw 15-4n-13w	65	1556
H. L. Gentry, Wilson 1, nw nw ne 29-1n-13w	200	1384
Berrien County—		
Lakeland Oil Corp., Plym 2, nw ne se 1-7s-17w	*	923
Cass County—		
Little Four Oil Co., Waage 1, nw sw ne 22-8s-15w	*	819
Silver Creek Oil Co., Flynn 3, ne sw nw 23-5s-16w	8	897
Gladwin County—		
Whitehill & Drury, Fessell 1, ne ne sw 36-17n-2w	*	4012
Chapman Oil Co., Gulf 1, ne nw sw 23-18n-1e	*	3700
Monroe County—		
Vanco Oil Co., Montry 3, sw ne sw 30-6s-6e	75	2207
Ottawa County—		
Fisher-McCall Oil Co., Krafgt 1, nw nw se 22-5n-15w	*	1645
Isabella County—		
Cities Service, Unit D-1, se nw ne 17-16n-3w	*	1326
American Dr. Co., Smith 1, se nw sw 21-16n-3w	25	3712

Mississippi

Company, Well and Location	Init. Prod. Bbls.	Depth
Lamar County (Wildcat)—		
Willmut G. & O. Co., Tatum 1, 14-2n-16w	*	2075
Yazoo County (Tinsley Dome)—		
E. C. Johnston, Brumfield B-7, 2-10n-3w	200	4734
Slick-Urschel, Slick 10, 2-10n-3w	195	4824
Union Prod. Co., Stevens 17, 12-10n-3w	300	4836

Montana

Company, Well and Location	Init. Prod. Bbls.	Depth
Glacier County (Cut Bank)—		
Montana-Headlight Oil Co., Britton 7, c nw ne 11-34n-6w	120	2889
Texas Co., Unit 4, cwl nw sw 11-35n-6w	112	3030
Tweedy 5, c sw nw 21-35n-6w	25	2983
Unit 9, c nw sw 9-32n-5w	95	2982

Nebraska

Company, Well and Location	Init. Prod. Bbls.	Depth
Nemaha County—		
Shrock et al, Rogge 1, nwc 17-5n-13e	*	2472

New Mexico

COMPLETIONS

Company, Well and Location	Init. Prod. Bbls.	Depth
Eddy County —		
Addison Oil Co., Ginsburg 4-A, nw se ne 17-18s-31e	125	3198
F. E. Baker et al, Root 1, c se nw 12-17s-29e	245	2563
Bassett & Birney, Platt 2, nec sw 26-18s-26e	90	1211
H. A. Hazeltine et al, Hastie 1, nw sw sw 18-17s-28e	10	539
Macy-Tallmadge et al, State 2, c sw se 2-17s-29e	35	2735

[*Continued on next page*]

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United States Well Completions—*Continued*

Company, Well and Location	Init. Prod. Bbls.	Depth

NEW MEXICO—Continued

Sam Sanders et al, Berry 6, ne sw ne 24-17s-27e	50	489
Eddy County (Wildcats)—		
Knox-Featherstone, Hatchett 1, c sw ne 14-20s-26e	•	625
J. B. Mulcock et al Etz 1, c sw sw 25-16s-30e	¶2.4	3082
Lea County (Arrowhead)—		
Humble, State 4-M, c ne nw 18-22s-37e	636	3714
Lea County (Corbin)—		
Helmerich & Payne, Corbin-Texaco 2, c ne se 9-18s-33e	70	4350
Lea County (Eunice)—		
Cities Service, Closson 4-B, ne nw ne 19-22s-36e	395	3810
Lea County (Maljamar)—		
Carper Dr. Co., Simon 3-N, c se nw 29-17s-32e	75	3789
Barney Cockburn et al, Baish 13-B, c se se 27-17s-32e	320	4152
Baish 23-B, c nw sw 28-17s-32e	300	3864
John Cockburn et al, Miller 1-A, c nw sw 26-17s-32e	450	4073
Lea County (Vacuum)—		
Great Western Producers, Inc., State 2-E, nwc sw 25-17s-35e	•	4630

New York

Allegany County—		
R. B. Moore, Wetherby farm, Bolivar	5	1447
Sawyer & Williams, Richardson farm, Bolivar	5	1261
C. H. Christman, Underwood farm, Scio	•	1556
N. V. V. Franchot, Reddy farm, Alma	7	1441
Harold Duke & L. E. Norton, Oak Norton farm, Scio	1	1379
Ralph Thompkins et al, Rahr farm, Scio	1	562
Fulmer Oil Co., Jordan farm, Independence	2	1279
Messer Oil Co., Koehler farm Clarksville	4	1430
Sloan & Zook, McDivitt farm, Bolivar	4	1372
Water Intake Wells—		
Wm. Taylor Est., Reid farm, Alma	.	1446
Dick Oil Co., Cameron farm, Bolivar	.	1456
L. H. Thornton et al, Brown farm, Alma	.	1380
H. W. Patterson, Fuller farm, Scio	.	831
Rufus Scott et al, Scott farm, Bolivar	.	1562

Ohio

Athens County—		
F. S. Moore, Stout 1	¶0.1	1194
Cody, Ruth Hrs. 3	¶0.1	1635
Orndoff, White 3	¶0.09	363
Keirns 3	¶0.04	1397
Ohio Fuel Gas, Petty 1	•	1703
Coshocton County—		
Butler Bros., Borden 1	•	1132
Fairfield County—		
City Nat. Gas, Deeds 3	¶0.04	507
Matheny 1	¶0.12	2149
Gallia County—		
B & W Gas Co., Mink 3	¶0.05	1560
Guernsey County—		
Ridgeway et al, Ford 1	¶0.05	1093
Jewell Cubbison 1	¶0.04	1226
Holmes County—		
Ohio Fuel Gas, Houser 1	¶0.2	2879
Knox County—		
Perkins, Mickley 1	¶4.26	2774
Britton 2	¶0.09	2560
Licking County—		
McClay Bros., Smith 1	40	3028
Everette, Montgomery 1	35	2918
Hunt et al, Hunt 1	¶1.2	2375
Ohio Fuel Gas, Hansberger 11	¶0.65	2597
Pigg 1	¶0.1	2592
Willey et al, Stock 1	¶0.37	2543
Hoover 1	¶0.33	2640
Hoffer 1	¶0.25	2400
Davis, Wilkin 1	¶0.33	2736
Lorain County—		
Ohio Fuel Gas, Porter 1	¶1.15	2667
Medina County—		
DeFustro & Sawyer, Allis D-24	5	424
Allis H-22	5	400
Allis F-22	•	426
Allis E-23	I	383
Allis E-25	I	397
Allis G-21	I	375
Allis G-23	I	392
Allis G-25	I	394
Allis I-21	I	371
Allis I-24	I	385
Adair et al, Parker 1	•	409
Monroe County—		
Hines O. & G. Co., Smith 1	10	1310
Parks, Kinsey 3	¶0.06	1205
Newhart et al, Loughry 3	¶0.06	2055
Lucas et al, Buchanan 1	¶0.03	2024
Morgan County—		
Harris, Worthington 4	•	1025
Muskingum County—		
Ohio Fuel, Fisher 1	50	3850
Noble County—		
Yoker Valley Ankrom 2	¶0.39	1605
Smithberger et al, Michel 1	¶0.05	1546
Permian O. & G., Dientsbach 1	¶0.04	1391
Ward, Stotts 1	•	1460
Perry County—		
Ohio Fuel, Ream 1	25	3259
Washington County—		
Campbell, Liebrand 1	¶0.2	1381
R. E. Shafer et al, Lauer 1	¶0.04	1630
McTaggart et al, Male 2	•	1389
Wayne County—		
Bryan et al, Yocum 1	•	672

"I" indicates water input well.

Oklahoma

Caddo County—		
Hughley et al, Wagner 2, ne se ne sw 3-5n-9w (OTD 3531)	¶ 18.0	4332
English, Covey 4, ne nw ne sw 11-5n-9w	398	3437
Magnolia, McKenna 8, nw ne se 11-5n-9w (OTD 2356)	944	3998
Henley 4, se se ne se 35-6n-10w	61	3272
Carter County—		
Kyle, Dougherty 8, ne se sw 17-4s-2w	294	2210
Batson, Williams 6, ne sw se ne 20-4s-2w	¶ 8.5	2232
Gibson et al, Griffin 2, se se 20-4s-2w	370	2148
Jones Oil Co., Sullivan 5, ne nw se 36-4s-2w	21	2600
Creek County—		
Billingslea, Wayman 4, nw nw se nw 22-15n-8e (OTD 2897)	•	3225
Franchot, Kiefer 35, ne se sw 17-17n-12e	gas inp	1528
Grady County—		
Ray, Laws 1, ne ne sw se 21-3n-5w (OTD 2375)	50	2400
Jefferson County—		
Bridwell, Seay 3, se ne se sw 29-6s-5w	•	1679
Kay County—		
Ohio et al, State 2, sw ne sw 16-28n-1w	52	3667
Kiowa County—		
Hurst et al, Groth 1, se sw 3-4n-16w	•	520
Lincoln County—		
Mohican, Hoffman 1, sec 18-12n-6e	•	3446
Berkey et al, Tedford 1, nec nw 28-12n-6e	•	3405
Oklahoma Oil Corp., Berry 1, sec nw 28-16n-5e	•	3446
Logan County—		
Mid-Continent, Campbell 6, ne se ne 33-17n-4w (OTD 6120)	¶ 3.2	4900
Marshall County—		
Pure, Thomas 1, ne se nw 28-5s-7e	1496	5091
Muskogee County—		
Musselem, Owens 1, c s½ nw 34-15n-18e (OTD 1090)	•	1870
Okfuskee County—		
Flemming, McKinney 2-A, sw sw nw se 18-10n-11e	¶ 3.5	1171
Seran, Fee 3, nw se nw 2-11n-8e (OTD 3450)	•	4020
Texas, Martin 1, nec 7-11n-10e	¶ 4.3	3677
Shell, Replogle 3, sec 35-11n-8e	202	3471
Texas, Berryman 1, nw se sw 36-11n-8e	•	4320
Droppleman, Dill "C" 2, se ne se 34-12n-8e	200	3574
Oklahoma County—		
Continental, Volk 1, nwc se 15-11n-3w (OTD 6560)	268	6574
I. T. I. O., Olds 13, se se ne nw 24-11n-3w	152	4038
Hall & Broscoe, Francis 1, se sec sw 22-12n-3w (OTD 6496)	400	6522
British-American, Military 3, se nw ne sw 34-12n-3w	822	6524
Dorr et al, Riley 1, nec se 34-13n-1e	•	115
Okmulgee County—		
Shock et al, McKee 2, sw se ne 17-14n-11e	75	2407
Osage County—		
Peters et al, Osage 15, c sw 16-22n-9e	10	2661
Pontotoc County—		
Simpson-Fell, Westheimer 1-A, se se ne ne 27-2n-7e (OTD 3714)	15	2680
Huddleston, Freeman 2, sw nw ne ne 33-5n-8e	18	692
Pottawatomie County—		
Maebris, Brown 1, swc nw 33-7n-4e (OTD 4200)	500	4246
Brown 3, se sw nw 33-7n-4e (OTD 4144)	560	4194
Brown 4, ne sw nw 33-7n-4e (OTD 4178)	450	4229
Seminole County—		
Atlantic, Baker 2, ne se se 10-8n-6e (OTD 4168)	•	2296
Amerada, Newell 1, sec nw 3-10n-5e (OTD 4450)	241	4655
Droppleman, Gahagen "A" 2, se ne ne 3-11n-8e	1642	3570
Stephens County—		
Ware et al, Simpson 5, se sw ne ne 11-1n-5w	5	1537
Tillman County—		
Kline, Stalley 1, sec nw 10-2s-19w	•	6750

Pennsylvania

BRADFORD DISTRICT

Andrews & MacDowell, Bing 326	2	....
Bradford Tr. Co., 16 wells	16	....
Niagara Oil Corp.	1	....
Tapp, Gallets & Buffington, Trs., Fee	5	....
Messer Oil Corp., Loop, 2 wells	7	....
Quinlan Oil Co., Fee	2	....
Water Intake Wells—		
Pine Run Oil Co., Bing 130-1-2-3-4-6	.	....
Forest Oil Corp.	.	....
Forest Pet. Corp.	.	....
Niagara Oil Corp.	.	....

BUTLER-ARMSTRONG DISTRICT

John P. Baldauf & Co., Hoffman	¼	....

MIDDLE DISTRICT

Cities Service, Red Fox	5	....
Bellview Oil Co., Lot 531	2	....
Second Natl. Bk. of Titusville, Columbia East Side	1	....
John Exley et al, Switzer	1	....

NEW YORK-PENN GAS FIELD

Hanley & Bird, Stanley Murray	•	....
New York State Nat. Gas Co., Burt & Lyman 2	•	....

SOUTHWEST PENNSYLVANIA

Allegheny County—		
Maryin Bros., Martin 1	1	1650
Armstrong County—		
Peoples, Kough 1	¶0.44	3495
Fayette County—		
Eberly, Snee et al, Lincoln Coal & Coke 1	¶1.3	1873
Greene County—		
Freeland et al Freeland 3	¶0.15	3222
Indiana County—		
T. W. Phillips G. & O. Co., Roof 1	¶0.18	1534
Brewer 1	¶0.06	3413
Ramsey 1	¶0.03	3282
Anderson 1	•	3215
Washington County—		
A. V. Lewis et al, Bonham 3	40	3116
R. M. Duden et al, Baires 5	1	2227
Carnegie Nat. G. Co., Nicholl 1	¶0.21	933
John Johnson et al, Stevenson 1	•	1450
Westmoreland County—		
Apollo Gas Co., Anderson 1	¶0.41	1174
Peoples Nat. G. Co., Swank 1	¶0.06	3202

Texas Gulf Coast

Big Creek—		
Hatton Cockrell 3	108	1098
Blue Ridge—		
R.L.P. Prod. Co., Gulf 3	285	4165
Clam Lake—		
Shell-Humble, McFaddin 5	124	5941
Esperson—		
General Crude, Esperson 15-B	648	6504
Fannett—		
Gulf, Marrs McLean 2-E	822	8250
Hillje—		
Texas, Schulze 1	•	5240
Hastings—		
Laura C., Elgnus 1	•	1250
Lovell's Lake—		
Humble, Beaumont Lch Clb C-2	168	7803
Steinhagen B-6	¶	7773
Turner 3	•	7776
North Markham—		
Ohio, Cornelius 2	253	8053
Raccoon Bend—		
Humble, Woodley 17-Y	•	8589
West Columbia—		
Gulf, Mays 4	345	5693
Texas, Phillips 17	136	5703
Withers—		
Michaux, Melcher 2	110	5543
Texas, Pierce B-62	65	5542
Chambers County—		
Humble, State 6-B-300, Galveston Bay	•	9500

West Central Texas

Callahan County—		
Grass Roots Oil Co., Wilson 1	•	545
Coleman County—		
Bradford & Robertson, Gillespie 4	57	3574
Morris 4	118	3541
States Oil Corp., Morris 4	203	3583
Comanche County (Wildcat)—		
C. D. Lane et al, Stout 1	•	3100
Eastland County (Wildcat)—		
L. M. White et al, White 1	•	900
Eastland County—		
Hickok P & Dev. Co., Wright 1	•	3713
Jones County—		
Humble, Rosewasser 1	•	1771
Lietz & Archer, Harvey 2	•	1712
Shackelford County—		
L. H. Choate et al, Dyer 3	•	1263
Hickok P & D Co., Harry Reynolds, Nail 9-A	75	1591
Jones-Stasney et al, Dawson-Conway 1	•	1660
Rhodes & Higher, Davis 1-B	•	1495
A. P. Schkade et al, Fee 3	¶0.5	523
Ungren-Frazier & Beams Dr. Co., Dyer 4	•	930
Shackelford County (Wildcat)—		
Kittery Oil Co., Hendrick 1	¶9.75	1612
Stephens County—		
Wittmer O&G Properties, Loving 4	35	3576
Taylor County—		
W. J. Walsh et al, Fain 1	361	2407

REDA in-

97½ H.P. Reda Unit installed in Pottawatomie County, Oklahoma, well. Set at 4200'. Produces 1400 barrels fluid and 125 oil per day.

OKLAHOMA FIELDS

This is one of the many Reda-equipped wells in Oklahoma and the Mid-Continent Area producing large volumes of fluid with comparatively low oil percentages. Some of these wells have produced with Reda pumps, after operation by other methods was discontinued, nine times as much oil as was previously estimated to be recoverable.

These records are due to the higher capacities available with Reda pumps and to the fact that the per barrel lifting cost of Reda is lower.

If you suspect you have wells capable of producing more, daily and ultimately, investigate Reda. If you have wells of any capacity ready to equip for pumping, compare our prices. You will incur no obligation by requesting our recommendation and may receive information of considerable value to you.

Let us give you the facts.

REDA PUMP CO.

BARTLESVILLE, OKLA.

HE ONLY SUBMERGIBLE ELECTRICAL CENTRIFUGAL OIL WELL PUMP

United States Well Completions—*Continued*

West Texas

Company, Well and Location	Init. Prod. Bbls.	Depth
Andrews County—		
Humble, Means 83	1054	4535
Crane County (Church-Fields)—		
R. B. George et al, University 2	508	3095
Crane County (Gulf-McElroy)—		
Gulf, McElroy 230	1026	2940
Crane County (Sand Hills)—		
Humble, Tubbs 44	1571	4400
Ector County (Foster)—		
Atlantic Ref. Co., Brock-Jones 2	1263	4130
Forest Dev. Corp., Moss 1-H	744	4300
I. T. I. O. Co., Johnson 3-B	1434	4151
Ector County (Goldsmith)—		
Gulf, Goldsmith 319	1199	4246
Ector County (Jordan)—		
Cities Service, University 6-C	658	3610
Ector County (North Cowden)—		
Barnsdall, Smith 19	1044	4395
Cities Service, Rhodes 8	3044	4195
Gaines County (Seminole)—		
Atlantic Ref. Co., Riley 4-D	67	5309
Magnolia & Atlantic, H. & J. 6-221	346	5253
Gaines County (Wasson)—		
Continental Oil, Moore 6-46	1469	5055
Wasson 5-49	983	5050
Wasson 7-49	1259	5058
Hockley County (Slaughter)—		
Magnolia, Mallett 1-G	624	5008
Stanolind, Slaughter 10-B	599	5055
Pecos County (Fromme)—		
W. H. Burleson et al, Fromme 1	54	1439
Culbertson & Irwin, Fromme 5	33	1433
Valverde County (Wildcat)—		
Joiner Oil Corp, Sellers 1	*	2250
Ward County—		
Gulf, Hutchings 149	773	2690
O'Brien 150	1258	2774
Texas Co., University 6-E	1512	2685
Yoakum County (Wasson)—		
Aloco Oil Co., Keller-Texaco 10	489	5156
Denver Prod. & Ref. Co., Whittenburg 11-A	828	5143
Oil Development Co., Willard 3-38	994	5085

East Texas

Company, Well and Location	Init. Prod. Bbls.	Depth
Joiner Area—		
Atlantic Ref., Cox 5 (15.66-ac)	1200	3721
Fair Oil Co., Alford 2	219	3625
Kilgore Area—		
O. R. Cooper et al, Shaw 2	750	3553
Estelle Oil Corp.-XYZ Oil Co., I&GN 4, Tr. 2 (1.64-ac)	500	3640
Kirby Pet. Co., Reddic 17 (81-ac)	1000	3718
Longview Area—		
L. S. Flannery, Inc., York 4-A (20.2-ac)	1500	3596
Alex McCutchin et al, Jones 8	4500	3597
Jones 15	4000	3595
Anderson County (Cayuga)—		
Carter-Gragg Oil Co., Bass-Skelly 1	*	4143
Falls County (Wildcat)—		
Mack Hayes et al, Watkins 1	*	2200
Freestone County (Long Lake)—		
Hunt Oil Co., Dietz 2 (dual well)	¶60.0 & 84	5265
Houston County (Wildcat)—		
Elmer Hay, Starr-Pope 1	*	2132
Limestone County (Tehuacana)—		
Zephyr Oil Co., Peeples 5	144	2645
Navarro County (Corsicana-Powell)—		
Goodnight et al, Wade Smith 1	*	1619
Navarro County (Richland)—		
C. L. Brown et al, Brown 1	40	3003
Panola County (Bethany)—		
Holcomb & Thomasson, Crenshaw 15, James Cox sur	¶30.0	6108

North Texas

Company, Well and Location	Init. Prod. Bbls.	Depth
Archer County (Hull-Silk Bend)—		
Thurmond Oil Co., R. C. Lipscomb, Wilson 9	1376	4635
Archer County (Hull-Silk)—		
Cochran & Cain, Wilson 1	*	4800
Bert Ligon et al, White 11-D	72	3920
Peterson & McCarty, Wilson 36-B DD from 4402 ft.)	1246	4565
Phillips Pet. Co., Little 7	1128	4388
Texas Co., Wilson 44-A	196	4393
Archer County—		
Cochran & Cain, Little 10-B	53	1322
F. T. Johnson et al, Hudson 2-A	7	1171
Bert Ligon et al, White 9-C	*	999
W. C. Young, Jr., et al, Morrison 3	10	1317
Archer County (Wildcat)—		
W. B. Omohundro et al, Wilson 1 (DD from 4416 ft.)	*	5058
F. P. Pace et al, Hyer-Burnett 1	*	1166
Trentman Co., Prideaux 1	*	806
Clay County—		
Apache Oil Co., Henderson 6	*	1366
Clay County (Wildcats)—		
L. T. Burns et al, Patrick 1	*	1350
Calloway 1 (dd from 5356 ft)	*	6125
Cooke County—		
C. J. Bohner et al, Linn 1	10	1089
Metzner & McKee, Henscheidt 1	88	764
Henscheidt 2	34	792
Trumter Pet. Corp., Stacey 7-B	16	756
Cooke County (Walnut Bend)—		
Magnolia, Ramsey 11	907	4783
Sinclair Prairie, McGeorge 16	258	4983
Haskell County—		
J. C. Hunter et al, Pardue 1	*	3514
Foard County (Allee)—		
Baldwin & Reed Dr. Co., Gamble 1	175	2364
Jack County (Wildcat)—		
Schmid & Willis, Kinder 1	2	2142
Jack County—		
Reimers-Walker Oil Corp., Powers 1	3	426
Three-Bee Inv. Co., Epperson 5	608	3005
Wrightsman Oil Co., Mathis 1	126	2992
Montague County (Benton-Holmes)—		
L. S. Flannery, Inc., First Nat'l Bank (St. Jo.) 1	840	3893
Montague County (Bonita)—		
Magnolia, Gilbert 3 (PB to 5482 ft.)	130	6003
Montague County (Wildcats)—		
Tom Owens-Larry Hults, Lee Tucker 1	2170	6050
Seitz-Comegys & Seitz, Harris 1	*	6939
Throckmorton County—		
Walter Neustadt et al, W. McKeichan 1	4	428
Morrison 3	*	507
Throckmorton County (Wildcat)—		
Walter Neustadt et al, Poage 2	*	642
Wichita County—		
Akin-Dimock & Costley, Brown 1	30	1628
J. E. Farrell et al, Waggoner Bros. 37-D	9	820
J. W. Gookin et al, Allen-Foster 1	†	752
J. L. Jackson et al, Fee 1	*	2660
Geo. Proctor et al, Foster 1-B	*	948
Ruyle Farm Oil Co., Ruyle 54	2	1529
Texas Co., Honaker 77	1	1061
C. W. Winfrey et al, Birk 1	*	875
Wichita County (K-M-A)—		
Hammon-Hanlon & Buchanan, Fassett-Tuttle 32	560	4024
Kadane-Griffith Oil Co., Martin 3	600	3830
Tide Water et al, Pettit 26	712	3780
Ven-Mex Oil Co., Big Wichita River 15-A	848	3790
Wichita County (Wildcat)—		
Dudley & Fisher, Reece-Fisher 1	*	740
Wilbarger County (Fargo)—		
Amerada Pet. Corp., Dodson 1	1584	3279
Young County —		
Collins & Doss, Kirkland 1	*	624
C. B. King et al, Dailey 9	4	559
W. F. Palmer et al, Morrison 1	*	975

South Texas

CORPUS CHRISTI DISTRICT

Company, Well and Location	Init. Prod. Bbls.	Depth
Brooks County—		
Humble, McGill Bros. 75 (Kelsey)	250	4732
Goliad County—		
Renwar Oil Corp., Swickhiemer 1 (WC) sur 316	*	5005
Hidalgo County—		
Royal O. & G. Corp., Yturria Town & Impro. Co. 1-A (WC) Procs. 43 & 44 new fld.	250	3553
Jackson County—		
Barnsdall, Lillie Lazarus 4 (Lolita)	500	5935
Louis Crouch, Davis 1 (West Ranch)	600	5755
Darby Pet. Corp., Turner 3 (West Ranch)	1250	5769
W. L. Goldston, M.-P. R. R. 2 (Lolita)	800	5932
Humble, L. Ranch Co. 4-A (Lolita)	500	5932
Magnolia, Bennett-Fee 1 (West Ranch)	1400	5768
Hinshaw 4 (Lolita)	475	5932
Mitchell 3 (Lolita) opens new sand	475	5278
Stepan 2 (West Ranch)	1200	5770
Ward 6 (Lolita)	750	5931
Phillips, Simon & Seidel 2 (West Ranch)	1000	5830
Shell, Willoughby 2 (Lolita)	500	6495
Jim Wells County—		
Anderson-Prichard Mueller et al 6 (Wade City)	500	4919
Beuscher-Armstrong, Muil 1 (Clark-Muil)	*	5758
O. W. Killam, Wade Est. 11 (Sandia)	*	5203
Magnolia, Schmidt 5 (Wade City)	400	4932
Seaboard Oil Co. of Del. Cohn 1 (WC) Sec 15	*	6295
Karnes County—		
H. J. Baker, Ruchman Ranch 1 (WC) J. Powell Sur	*	3022
Live Oak County—		
Brauer, Holland & Smith, Gayle et al 3-B (White Creek)	70	1311
Coquat, Holland & Smith, Goad 2 (White Creek)	30	1516
Edwin M. Jones, West Est. 1-B (WC) L. A. Fant sur	*	8387
A. R. Pohley, Maurin 1 (WC) Stephen Hays sur, ab 10	*	897
Nueces County—		
Humble, State-Flour Bluff 4-D (East Flour Bluff)	600	6807
State-Flour Bluff 2-E (East Flour Bluff)	600	6796
Southern Minerals Corp., King 6 (King-Bentonville)	150	5608
Texas Co., Taylor 1 (South Clara Driscoll)	450	5456
Roman S. Waldron and E. A. Graham, Lear 1 (WC) sec 4 blk 2	*	7022
Refugio County—		
Quintana Petr. Corp., Heard 43 (Tomoconnor)	150	5925
San Patricio County—		
M. M. Miller & Sons, Timon 1 (WC) Blk 29	*	5600
Victoria County—		
Gulf, Keeran et al 19 (Keeran)	50	10,043
Traylor 44-B (Heyser)	400	5490
Transwestern Oil Co., McFaddin Est. 17-E (McFaddin)	*	5400

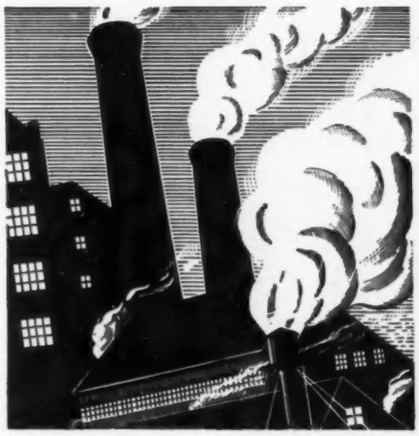
LAREDO DISTRICT

Company, Well and Location	Init. Prod. Bbls.	Depth
Duval County—		
J. B. Blanchard, Lowe 2 (WC) sur 72	*	3222
Continental, Driscoll, Jr., Est. 57-A, (Driscoll)	*	3859
E. B. Cox & J. L. Hamon, Salazer 1 (Hoffman)	10	2628
Cuellar Bros. Oil Co., Cuellar 2-C (Hoffman)	70	2664
Gilcrease Oil Co., Weil Est. 1 (WC) Manuel and Rogers sur 568	*	2940
Government Wells Oil Co., Lundell 48 (Lundell)	55	1520
Ide Howeth, Kreis 1 (WC) sur 68, new fld	38	3261
Magnolia, D. C. R. C. 4 (196) (WC) blk 15, 1 mi sw Cedro Hill fld.	*	2555
D. C. R. C. 6 (289) (West Casa Blanca)	*	1466
D. C. R. R. 15 (58) (Lundell)	*	1517
Jim Hogg County—		
C. Andrade III, Trevino (Martinez) 3-F (Colorado)	525	2924
Humble, King-Colorado 18 (Colorado)	450	3020
King-Colorado 20 (Colorado)	500	3011
Navarro Oil Co., Allen 5-A (Manila)	300	2649
Texas Co., Armstrong 2 (WC) A. Villa sur 90, Gutierrez area	*	3731
McMullen County —		
Marion Prod. Co., Lark 7-A (Callihan)	6	1045
Starr County—		
W. R. Davis Co., Slick Est. 29-B (Rincon)	500	4300
Slick Est. 35-B (Rincon)	300	4430
Arthur Harvey, Davenport 1 (North Rincon)	78	5210
Moore 1 (WC) sur 513, 1 mi w North Rincon fld	*	5017
Webb County—		
Jay Simmons, Hinnant 1 (WC) sur 126, sw Glen fld	*	2210
Zapata County—		
Jay Simmons, Yaeger-Strohman 3 (Glen)	133	2186
Transwestern Oil Co., Yaeger-Strohman 1 (Glen)	216	2177

West Virginia

Company, Well and Location	Init. Prod. Bbls.	Depth
Boone County—		
Owens-Libby-Owens, Allen & Pryor 28	¶0.42	2035
Little Coal Land 22	*	2635
Braxton County—		
Pitts. & W. Va. G. Co., Fulks 7767	¶4.93	1767
Berry 7730	*	2038
Cabel County—		
Merritts Creek Gas Co., Pineview Land 1	¶0.24	3021
Calhoun County—		
M. V. Knight, Ward 1	12	2000
So. Penn Nat. G. Co., Sharpe 5	5	2145
Bruce Farrell, Jr., Erlewine 1	*	2273
Clay County—		
Thompson G. Co., Thompson Land & Coke T-47	¶0.13	2081
Joe Rubin, Adena Corp. 1	¶	1238
Pitts. & W. Va. G. Co., Boggs 7638	*	4621
Gilmer County—		
Mud Lick O. & G. Co., Skinner 1	¶0.3	1740
Jackson County—		
Mountain Iron & Supply, Castro 4	1	1541
Kanawha County—		
Spartan Gas Co., Young 1	¶4.12	4818
Lewis County—		
Massey O. & G. Co., Keith 1	¶0.08	2760
Lincoln County—		
United Fuel, Lincoln Land Asso. 2050	*	3755
Monongalia County—		
Roy W. Clovis, Johnson 2	¶0.26	1327
Monongahela Gas Co., Fox 1	¶0.06	3552
Pleasants County—		
Columbian Carbon, Hammat Hrs. 2	*	2930
Putnam County—		
Randolph G. Co., Humphrey Hrs. 1	¶5.89	1720
Ritchie County—		
R. W. Richards Fee 2	1	1960
L. E. & W. H. Mossor, Daugherty 1	¶0.26	1961
Wetzel County—		
Manufacturers Lt. & Ht. Co., Shiebelhood 1	¶5.57	3141
Wirt County—		
G. L. Shimer, Fought 1	3	968
Wood County—		
Stillwell Oil Co., Addeman 1	*	2335

What is America's Secret Weapon of Defense?



It isn't secret at all—this great weapon of America that forms such an essential and dependable bulwark in the scheme of national defense. Most of us come in contact with some part of it during every business day. Countless thousands of us *are* part of it. For this great "Secret" Weapon of Defense is American Industry!

The same American Industry that showed the way to the world in producing the first practical machine gun, the first submarine, the first airplane.

The same American Industry that in an earlier day established the supremacy of the rifled firearm, gave the world its first steamship, demonstrated the defensive value of armored vessels of war.

The same American Industry that is organized today as never before in its history . . . that in this era of mechanized warfare has become America's first line of defense . . . that is "secret" because no one in all the world has ever been able to gauge the full extent of its productive capacity!

SKF, with its vastly increased facilities for producing ball and roller bearings that are now being used by the Army and Navy and Air Corps, is proud to take its place alongside of the thousands of other industrial organizations that form: America's "Secret" Weapon of Defense. SKF Industries, Inc., Philadelphia, Pa.

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SKF

BALL AND ROLLER BEARINGS

WILDCAT REPORT
New Starts and Completions

ARKANSAS
FIRST REPORT

St. Francis County—United States Oil Corp.'s Johnson 1, 29-4-1, sur csg 214 ft.

CALIFORNIA
FIRST REPORTS

Kern County—Ebert E. Smith's Smithhart 1, 34-30-22, rig, McKittrick area.
Kings County—Blair Oil Co.'s Blair 1, 24-23-26, rig, Reef Ridge area.
Santa Barbara County—Milburn & Hamilton's Rutherford 1, 36-5-31, dr 195 ft, Refugio area.

COMPLETION

Kern County—Seaboard Oil Co.'s Beer 66, 17-26-19, td 8821 ft in hard gray Cretaceous shale, abnd, Devils Den area.

KANSAS
FIRST REPORTS

Cowley County—Wakefield et al's Durham 1, c w½ nw se 34-30-3e, dr.
Rooks County—Palmer Oil Co.'s Denio 1, c e½ sw ne 17-8-16w, dr.
Sumner County—Shawver et al's Knowlton 1, c w½ nw se 6-33-2e, rur.

COMPLETION

Marion County—H-L-N Oil Co.'s Shields 1, c s½ se se 19-17-4e, 2½ mi w Lost Springs pool, Mississippi 2452 ft, abnd 2493 ft.

SOUTH LOUISIANA
FIRST REPORTS

St. Bernard Parish—California Co.'s Biloxi Marsh Lds 1, sec 25-12s-16e, lcn.

COMPLETIONS

East Baton Rouge Parish—F.W.D.'s Aldrich & Hart 1, 3 mi sw University fld, sec 60-8s-1w, abnd 7501 ft.
Iberville Parish—Superior's Schwing 5, new sd Bayou Blue, sec 74-9s-10e, perf 5722-30 ft, flwd 170 bbls 35.8-gr oil, 9/64-in ch, tbg/csg pressure 800/890 lbs.
Livingston Parish—Humble's Great So. Lbr. Co. 1, South Satsuma or Denham Springs area, sec 21-7s-4e, abnd 9406 ft.
Plaquemines Parish—California Co.'s Delta Minerals 1, Lease 7, new sd Belle Chasse (Stella) fld, w bank Mississippi, sec 2-15s-24e, flwd 257 bbls 33.2-gr, ⅛-in ch, tbg pressure 2275 lbs, gas/oil ratio 1021/1, from 9980-85 ft.
St. Mary Parish—Texas' State 3, new sd West Cote Blanche, sec 20-15s-6e, perf 9058-86 ft, flwd 534 bbls 31.5-gr oil daily, 12/64-in ch, tbg pressure 1250 lbs.
Vermilion Parish—Fohs' Mulvey Irr. Co. 1, sec 34-11s-1w, new gas sd 3800 ft sw prod Gueydan fld, flwd 1,700,000 ft daily from 9230 ft, 10/64-in ch, tbg pressure 2600 lbs.

NORTH LOUISIANA
FIRST REPORT

Caddo Parish—Delta Dr. Co.'s Dunn 1, 24-17n-16w, mat for 2600-ft test.
Bossier Parish—Ed DeArmand et al's Elgin 1, sw 8-20n-13w, mat.
Grant Parish—Gholson & Hodge's Chicago Mill & Lbr. Co. 1, c ne ne 16-7n-1e, mat.

COMPLETION

DeSoto Parish—R. C. Swails et al's Jackson 1, nw sw 36-12n-14w, elev 301 ft, Blossom (Ozan) sand 2022-63 ft, abnd 2078 ft.

MICHIGAN
FIRST REPORTS

Gratiot County—Chartiers Oil Co.'s Wagner 1, ne ne sw 2-9n-4w, dr.
Mason County—Manistee Dev. Co.'s Macri 1, nw nw se 13-19n-15w, lcn.

COMPLETIONS

Gladwin County—Chapman Oil Co.'s Gulf 1, ne nw sw 23-18n-1e, Dundee 3544 ft, abnd 3700 ft.
Ottawa County—Fisher-McCall O. & G. Co.'s Krafgt 1, nw nw se 22-5n-15w, Traverse 1634 ft, abnd 1645 ft.

MISSISSIPPI
FIRST REPORTS

Attala County—Gulf Ref. Co.'s Peeples 1, ne 35-15n-9e, rig.
Jeff Davis County—Sun Oil Co.'s Ed Taylor D-1, se sw ne 32-6n-19w, mat.
Clarke County—W. H. Willsingham's State 1, c sw nw ne 16-4n-15e, mat.

COMPLETION

Lamar County—Willmut G. & O. Co.'s (W. S. F. Tatum et al) Tatum 1, se ne 14-2n-16w, salt 1502 ft, abnd 2075 ft.

NEBRASKA
COMPLETION

Nemaha County—Shrock et al's Rogge 1, nwc 17-5n-13e, 8 mi w Auburn, Hunton 2300 ft, sso 2464 ft, td 2472 ft, pb 2435 ft, perf 20 shots 2305-16 ft, 500 gal acid, abnd.

NEW MEXICO
COMPLETIONS

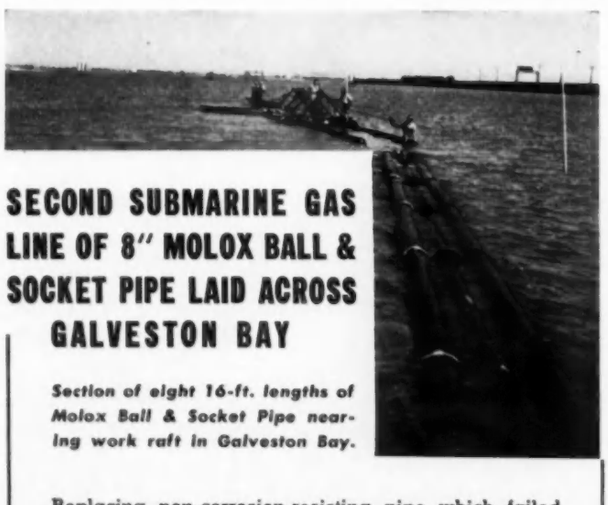
Eddy County—Knox & Featherstone's Hatchett 1, c sw ne 14-20s-26e, elev 3277 ft, abnd 625 ft. J. B. Mulcock et al's Etz 1, c sw se 25-16s-30e, elev 3829 ft, salt series 505-1310 ft, Yates 1480 ft, initial 2,400,000 ft gas natural at 2953-3082 ft.

OKLAHOMA
FIRST REPORTS

Comanche County—Hilton Phillips et al's Reick, nwc sw 29-4n-10w, pits.
Grady County—Adkinson et al's Gliks 1, nec se 22-5n-7w, rig.
Kiowa County—Dempsey & Son's Dempsey 1-A, nw sw ne 31-4n-18w, dr.
Okfuskee County—Portable Dr. Co.'s Nelson 1, ne se sw 1-11n-9e, dr.
Osage County—Starr et al's Osage 1, nec sw 29-25n-7e, lcn.
Payne County—Helmerich & Payne's Freeman 1, nwc sw 2-17n-2e, lcn.

COMPLETIONS

Caddo County—L. A. Hugley's Wagner 2, ne se ne sw 3-5n-9w, new hor Cement pool, otd 3531 ft, td 4332 ft, perf 10 shots 3598-3610 ft in sd, 18,000,000 ft gas.
Creek County—Shell's Linihan 1, ne se ne 31-15n-7e, 2 mi n Stroud pool, new pool, Second Wilcox 4079 ft, td 4119 ft, pb 4115 ft, shot 100 qts, 4090-4115 ft, 177 bbls, 40-gr.
Kiowa County—Dempsey & Son's Dempsey



SECOND SUBMARINE GAS LINE OF 8" MOLOX BALL & SOCKET PIPE LAID ACROSS GALVESTON BAY

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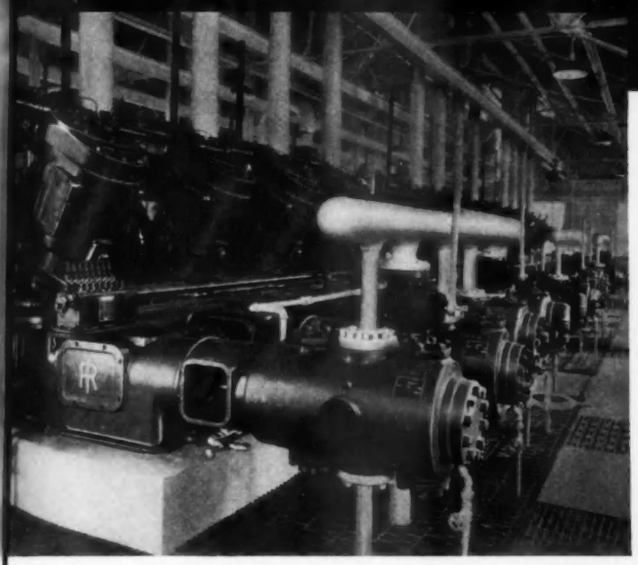
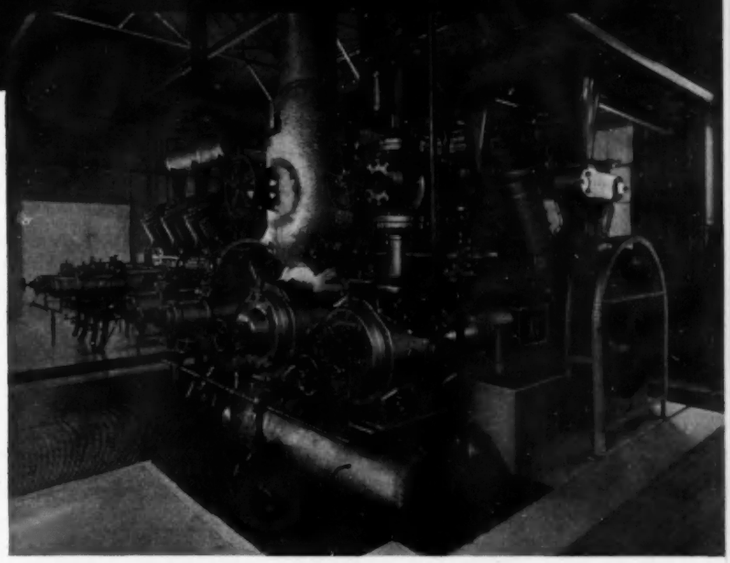


REPRESSURING AT LANCE CREEK This compressor plant, operated for three companies in the Lance Creek field, Wyoming, has three 8-XVG gas-engine-driven compressors. All cylinders are operating on repressuring service.



RECYCLING AT CAYUGA NO. 1 Two XVG gas-engine-driven compressors operated by Tidewater Seaboard Oil Co., Cayuga, Texas. The unit in foreground has two ammonia cylinders, operating 2-stage from 5-lb gauge intake to 185-lb gauge discharge. All other cylinders on this and the second machine are operating on recycling service.

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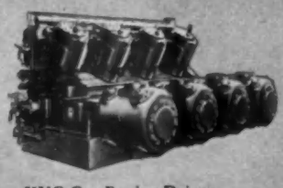
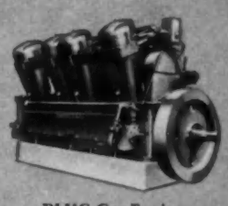


XVG Gas-Engine-Driven Compressor
75, 150, 225 and 300 hp.



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1, sw nw ne 31-4n-18w, 22 mi s Hobart pool, lost hole, abnd 290 ft.

Okfuskee County—Texas Co.'s Martin 1, nec 7-11n-10e, new hor N. Okemah pool, td 3725 ft, pb 3677 ft, perf 33 shots 2957-90 ft in Gilcrease sd, 4,300,000 ft gas.

Seminole County—Mid-Continent's Porter 1, nw sw nw 12-7n-7e, 2 mi s Wewoka pool, Cromwell 3507-70 ft, Wapanucka 3448 ft, Senora lm 2148 ft, Second Wilcox 4568-73 ft, td 4677 ft, pb 4430 ft, perf 26 shots 3555-70 ft, hfw, perf 36 shots 3475-95 ft, sag & water, perf 14 shots 2250-80 ft, no results, abnd 4430 ft. Stanolind's Grisso 1, ne nw sw 15-9n-6e, 1½ mi ext Seminole City pool, Senora sd 2893 ft, shot 20 qts 2910-20 ft, td 2924 ft, 70 bbls.

Wagoner County—Claude Jordan et al's Meriwether 1, nec 16-18n-17e, McCracken district, Mississippi 554 ft, abnd 700 ft.

TEXAS PANHANDLE
COMPLETION

Hutchinson County—Ed. Dunigan et al's Mayfield 1, nw part sec 2, A. B. Pedigo sur, elev 3347 ft, abnd 3335 ft.

SOUTH TEXAS
FIRST REPORTS

Bastrop County—Mossert and Dixon's Lentz 1, 300-ac tr, J. Lentz sur, 3 mi n Bastrop, lcn for 2500-ft test.

Bexar County—H. A. Potter's Miller 1, 50-ac tr, Francisco Rolen League and Labor sur 48, 17 mi sw San Antonio, 1½ mi n Somerset, sd 1324-41 ft, 5½-in csg 1304 ft, woc 1384 ft, contracted by Arthur Coyle.

Calhoun County—R. N. Ranger, J. W. Frazier & Crow's Stuzenbecker 1, 66.79-ac tr, Valentin Garcia gr, 5 mi n Port Lavaca, lcn, contracted by J. W. Frazier for 6500-ft test.

Goliad County—Banks L. Miller, Tr McFaddin 1, blk 47, B. L. Miller Re-Subd, 3034-ac tr, Pedro Trevino sur, 6 mi s Charco, 10-in csg 250 ft, dr 1765 ft on 5500-ft test.

Medina County—F. D. Spratt's Haegelin 1, W. E. Henlee sur 116, just s Taylor fld, sp and sd for 1000-ft test.

Nueces County—Seaboard Oil Co. of Del.'s Chapman Est. 1, 183.84-ac tr "B" in sw¼ of sec 78, Laureles Farm Tr subd of Chapman Ranch, Ramon de Hinojosa "Rincon de Corpus Christi" gr, 8 mi w Chapman ranch, mi, contract to Allen & Morris for 7800-ft test.

Refugio County—Hogan Oil Co.'s Kelly 1, 269-ac tr, James Powers sur, A 50, 1 mi nw Refugio, 10-in csg 420 ft, dr 1775 ft on 6500-ft test.

Zapata County—E. C. Brogan's Montemayor 1, cntr W 20-ac blk 5, sur 63, 1½ mi e Escobas fld, dr 725 ft on 2000-ft test. Fidelity O. & Roy. Co.'s Gopher Trust Est. 1, cntr lot 13, blk 3, Fulerton subd of Jose Vasquez gr, 4560-ac lse, 20 mi se Aguilarea lcn for 2000-ft test. Neilson & Palmer's Maryland Trust Co. 1, 40-ac blk 17, sur 314, 2 mi ne Escobas, lcn for 2300-ft test.

COMPLETIONS

Atascosa County—D. L. Higgins et al's Shannon 1, 1985-ac lse, A. J. Williams sur 950, 16 mi s Charlotte, abnd 1619 ft.

Bastrop County—Marts & Beaven, Inc.'s Harris 1, 95-ac tr, J. Maximilian sur, 3 mi s Red Rock, North Dale area, td 2179 ft, comp, est 115 bbl on pump fr Serp, extends North Dale fld.

Duval County—J. B. Blanchard's Lowe 2, 3040-ac lse covering surs 72, 74, 76, 414 and 465, 18 mi nw San Diego, abnd 3222 ft. Gilcrease Oil Co.'s Weil 1, Manuel & Rogers sur 568, 10 mi s Freer, 2½ mi sw Sarnosa, Mirando 2610 ft, abnd 2940 ft, contracted by Bancroft Dr. Co. Ike Howeth's Kreis 1, I & G N sur 68, 2000-ac lse, 17 mi nw San Diego, td 3261 ft, comp 38 bbl on swab and bailer, 2-in open tbg, 29.2-gr, new fld, contracted by Newman Bro. Magnolia's D. C. R. C. 4 (196), blk 15, 3068-ac lse Duval School Land sur 196, 12 mi sw Freer, 1 mi sw Cedro Hill fld, abnd 2555 ft.

Goliad County—Renwar Oil Corp.'s Swickhiemer 1, lot 29, Swfckhiemer subd, Cuadrilla Irr. Co. sur 316, 3.3 mi se Fannin, abnd 5005 ft.

Karnes County—H. J. Baker's Ruchman 1, blk 8, Ruchman subd, J. Powell sur, abnd 3022 ft.

Hidalgo County—Royal O. & G. Corp.'s Yturria Town & Improvement Co. 1-A, lot 4, Royal O. & G. subd of 503-ac lse, porcs 43 and 44, 427.4 ft e No. 1 blowout well, 7500 ft e Samfordyce fld, Nichols area td 3553 ft, comp, flowed 75 bbls, ¼-in ch, 925 lbs tp, 1350 lbs cp, perf 3497-3503 ft with 30 shots, 28.4 gr gas/oil ratio low, contracted by Baldridge & King, opens new fld.

Jackson County—Magnolia's Mitchell 3, 483.14-ac lse, S. F. Austin gr, 2402.6 ft e Mitchell 2, Lolita fld, td 5278 ft, comp 270 bbls 11/64-in ch, 650 lbs tp, 750 lbs cp, perf 5271-77 ft, new sd.

Jim Hogg County—Texas Co.'s Armstrong 2, A. Villa sur 90, ab 333, Gutierrez area, 1998 ft e-se Armstrong 1, gas/dist well, abnd 3731 ft, contracted by M. L. Massingill.

Jim Wells County—Seaboard Oil Co. of Del.'s Cohn 1, blk "A," sec 15, 1341.61-ac lse, Magnolia Fig & Orange Colony subd of Adams and Staples farm lots, Jose Paceco gr, cntr of blk, 10 mi se Alice abnd 6295 ft.

Live Oak County—Edwin M. Jones' West Est. 1-B, lot 197, subd "A" of George West Ranch, L. A. Fant sur, 2½ mi w George West, abnd 8387 ft, Jones' rig.

San Patricio County—M. M. Miller & Sons' Timon 1, blk 29, San Patricio de Hibernia Farm Trs, 1100-ac lse, 2½ mi ne Gallagher fld, 933 ft nw Midwestern Oil Co.'s Timon 1, 6065-ft dry hole, 5 mi se Mathis, abnd 5600 ft, contracted by Henderson Coquat.

Starr County—Arthur Harvey's Moore 1, 326.43-ac tr CCSD and RGNG sur 513, 1 mi w North Rincon fld, abnd 5017 ft.

Webb County—Jay Simmons' Hinnant 1, blk 4, sur 126, sw Glen fld, n Mirando Valley fld, abnd 2210 ft.

NORTH TEXAS
FIRST REPORTS

Archer County—W. B. Omohundro et al's Coleman 1, sec blk 50, W. M. Coleman subd of Day L&C Co. sur, lcn 6200-ft test.

Clay County—Carlos Wagner et al's Thaxton 1, nwc tr, T&NO sec 3, lcn 6000-ft test.

Throckmorton County—Jack Bell et al's Housley 1, swc blk 28, Comanche Indian Reserve, sp.

Wise County—Manahan Oil Co. et al's Collier 1, nwc 46-ac tr, J. M. Wade sur, A-868, rur for 6000-ft test.

Young County—L. T. Burns et al's Larimore 1, se sw TE&L sec 210, testing oil sand 875 ft. W. R. Stafford et al's Hamilton 1, nw TE&L sec 203, sp.

COMPLETIONS

Archer County—W. B. Omohundro et al's Wilson 1, se ne ne H&TC sec 5 blk 3, (dd from 4416 ft) Bend 4860 ft, abnd 5058 ft. F. P. Pace et al's Hyer-Burnett 1, sec Clark-Plumb sec 24, blk 5, abnd 1166 ft. Peterson-McCarty's Wilson 36-B, nec O'Reilly sur (dd from 4402 ft) Basal Strawn (new pay for Hull-Silk field acidized 4543-63 ft, shale to 4565 ft, flowed 623 bbls 44-gr oil 12 hrs ¾-in choke. Trentman Co.'s Prideaux 1, nwc W. L. Glasgow sur, abnd 806 ft.

Clay County—L. T. Burns et al's Calloway 1, sw lot 9, Hopkins CSL sur, (dd from 5356 ft) Bend 5540 ft, abnd 6125 ft; Patrick 1, ne sec 82, Byers subd, abnd 1350 ft.

Jack County—Schmid & Willis' Kinder 1 sec of B. Merrell sur A-391, pumped 2 bbls oil, 40 bbls water initial, sand 2130-42 ft.

Montague County—Tom Owens-Larry Hults' Tucker 1, nwc TE&L sec 2836, Palo Pinto lime 2462-2785 ft, Bend 6010 ft, flowed 2170 bbls initial natural 6016-50 ft. Seitz-Comegys & Seitz, Inc.'s Harris 1, swc ne of south 160 ac of BBB&C sur A-88, Bend 6551 ft, abnd 6939 ft.

Throckmorton County—Walter Neustadt et al's Poage 2, sw TE&L sec 933, abnd 642 ft.

Wichita County—Dudley & Fisher's Reece-Fisher 1, nw C. T. Ry. sec 2, abnd 740 ft.

EAST TEXAS
COMPLETIONS

Falls County—Mack Hayes et al's Watkins-McCoy 1, north cor tr, J. Powell sur, elev 408 ft, Austin chalk 1511-1661 ft, Georgetown lime 1950 ft, Edwards lime 2138 ft, abnd 2200 ft.

Houston County—Elmer Hay, Tr's Starr-Pope 1, nwc 162-ac tr, J. Forbes sur, abnd 2132 ft.

WEST CENTRAL TEXAS
FIRST REPORT

Hood County—W. G. Martin et al's Thormann 1, B. F. Anderson sur, lcn Ordovician test.

COMPLETIONS

Comanche County—C. D. Lane et al's Stout 1, ne part E. D. Corbitt sur, abnd 3100 ft.

Eastland County—L. M. White et al's White 1, nwc of 520-ac tr, subdiv 2, J. H. Kendrick sur, abnd 900 ft.

Shackelford County—Kittery Oil Co.'s Kendrick 1, sec 1, blk A, AB&M sur, lime pay 1605-12 ft, 9,750,000 ft gas initial.

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MEN IN THE INDUSTRY'S NEWS

A. W. PEAKE, board chairman of Stanolind Pipe Line Company, last week became president of the company in one of several personnel shifts coincident with retirement of Robert S. Ellison as president of the pipe-line company and Stanolind Oil Purchasing Company. The office of board chairman will be left vacant.

A. W. Peake

Ralph O. Dietler has been promoted from vice president to president of Stanolind Oil Purchasing Company. He will continue as general manager of the crude oil purchasing department of Standard Oil Company (Indiana) in connection with his new position.

B. P. Sibole, vice president of the Stanolind Pipe Line Company, has been named executive vice president and active executive head.

R. O. Dietler

B. P. Sibole

Other shifts involve promotion of Henry Waters from executive assistant to vice president of Stanolind Oil Purchasing Company, William G. Heltzel from general superintendent to vice department of Standard Oil Company pany, and J. B. Harshman from master mechanic to general superintendent.

PAUL GRIFFIN, vice president of Oklahoma Pipe Line Company, Tulsa, won the annual O.P.L.-Ajax Pipe Line Company employes golf tournament and president's trophy, defeating Eddie Birge in the finals. This is the third time Griffin has won the cup, although not consecutively.

ROBERT L. RUSSELL, 59, engineer-operator for Oklahoma Pipe Line Company, was retired from active service October 8th. He was employed as an operator in 1911 and had accumulated 27 years, 7 months and 26 days of continuous service.

WILLIAM F. HAIDER, engineer trainee with The Carter Oil Company, is now junior engineer with Standard Oil Company of Venezuela at Caripeto.

Six other employes of the company have accepted employment with the Venezuela company and have been transferred to Caracas. John P. Harbin is joint interest accountant; William Moore, Jr. and John C. Stone are general accountants, John W. Hall is property accountant and Robert D. Farneman and James B. Sullivan are with the coding personnel.

CHESTER M. CREBBS, Caracas, Venezuela, president of Mene Grande Oil Company, operating in both Western and Eastern Venezuela, was guest of honor at a cocktail party given last Thursday at the Ramada Club, Houston, by Chase E. Sutton, The Pure Oil Company, and Ray L. Dudley, publisher of THE OIL WEEKLY. Guests included executives of oil companies in Houston and South Texas. Crebbs will return to Venezuela in December.

JOHN O. BOWER, who succeeds William V. Vietti as manager of Texas Petroleum Company with headquarters at Bogota, Colombia, was originally employed by The Texas Company in July, 1923, and in October, 1927, after being out of the company's service for several years, he was employed as geologist by Texas Petroleum Company in Colombia. On June 1, 1931, he was transferred to California Petroleum Corporation of Venezuela as geologist, and four months later was transferred to Argentina as geologist for Ultramar, S. A. P. A. He was advanced to manager of the producing department of the latter company on July 1, 1936. He was employed by Antilles Petroleum Company, Trinidad, on November 20, 1938, holding that position until late last month when he became manager of Texas Petroleum Company.

THOMAS M. PRETTYMAN, 52, Fort Worth geologist and vice president of Westexas Oil & Royalty Corporation, died November 2 of a cerebral hemorrhage at his residence. He was a native of Virginia and a graduate of the Virginia Military Institute. His oil operations in Texas began at Cisco in 1925 with the forming of a partnership with Charles L. Renaud, both moving to Fort Worth in 1929.

REESE H. TAYLOR, president of Union Oil Company of California; W. L. Stewart, vice president, and A. C. Rubel, director of production, who are in Texas on an inspection trip, were guests last week of Bert Hull, president of Texas Pipe Line Company at a cocktail party at the Houston Club.

WILLIAM M. KAISER, JR., has been added to the Tulsa staff of Colona Manufacturing Company. He was formerly employed at the Alequippa mills and in the tubular goods inspection department of Jones & Laughlin Steel Corporation.

HAROLD L. BROWN has been appointed sales representative for McEvoy Company, Houston, with headquarters at 2215 Avenue A, Beaumont. He has served as a roughneck in Gulf Coast fields.

GEORGE A. DAVISSON, 56, operator and contractor of Eastland, Texas, died November 1. He was a native of Galveston.

ALEXANDER WATTS McCOY, Ponca City geologist and a past president of the American Association of Petroleum Geologists, last week was named manager of land, geological and geophysical departments of Deep Rock Oil Corporation, Tulsa, succeeding Luther H. White. In 1914-16, McCoy was instructor in geology at the University of Oklahoma, and later was geologist for Marland Oil Company. He was chief of sub-surface geology for Empire Gas & Fuel Company, Bartlesville, in 1917-19, and assistant chief geologist and general manager of the company in 1920. He was named first vice president of Marland Oil Company in 1921.

WALTER B. PYRON, executive vice president of Gulf Oil Corporation at Houston and general in the Texas National Guard, has been granted a leave of absence to go into active training with his brigade. No change in the company's executive personnel is anticipated as a result of his absence, and his work will be carried on by his assistants.

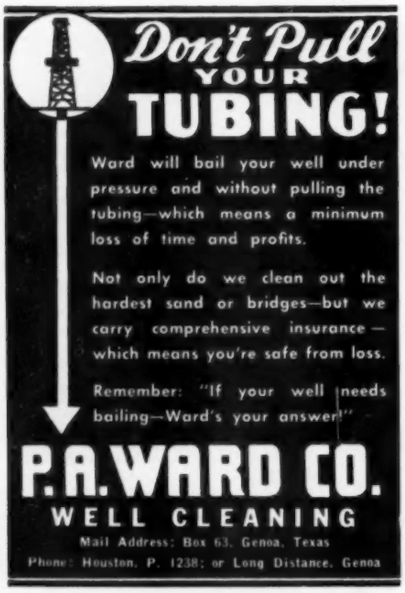
T. N. ST. HILL has resigned as vice president in charge of Petroleum Rectifying Company of California Division of Petrolite Corporation, Los Angeles. He will continue as a director of the company. His resignation was necessary to devote full time to duties as president and general manager of Tea Garden Products Company, San Francisco.

JOHANNES E. F. de KOK, 58, director general of Royal Dutch Oil Company and prominent in international oil for several years, died of heart trouble October 28 at The Hague.

While de Kok's rank as an oil man made him a familiar figure in the industry's activities, he also was a fervent aviation enthusiast. The extent to which he indulged in his hobby was indicated a few years ago when he purchased Ypenburg airdrome near The Hague to house his planes. De Kok established a new record for amateur flying in 1937 when he piloted his plane from The Hague, Netherlands, to Batavia, Java, East Indies, in 10 days despite adverse weather conditions. The distance is 9000 miles.

De Kok was born in Holland. Prior to graduating from the Breda and Delft Technical University in 1908 he had finished the prescribed course at the Royal Military Academy. After receiving a degree in chemical engineering from the former institution, he joined the Royal Dutch organization. His first job was exploitation engineer, a sort of drilling and production man operating in proven areas. A steady climb in the organization had gained for him the position of manager in 1921.

Royal Dutch interests broadened the scope of de Kok's responsibilities from 1921 on, taking some of the burden from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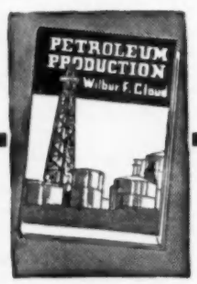

Petroleum Production

By Wilbur F. Cloud

A book dealing with the fundamental operations and technical processes of oil production. It offers to the oil executive, the engineer, and the man in the field a most comprehensive treatment of the subject.

PETROLEUM PRODUCTION

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MEN IN THE INDUSTRY'S NEWS

the shoulders of the late Sir Henri Deterding. When he became director general in 1937, shortly after death of Deterding his name was already listed on the directors' rosters of several oil companies throughout the world. De Kok was chairman of the board of Colonial Development Company, and was a director of Shell Transport & Trading Company, Astra Romana, Shell Union Oil Corporation, Mexican Eagle Oil Company and Anglo-Saxon Petroleum Company.

T. B. HALL has been appointed to succeed C. L. Ellis as superintendent of the Osage Agency at Pawhuska, Oklahoma. He attended Oklahoma A. & M. College, majoring in vocational education, in 1922-23 and 1926-27. In 1928 he was appointed field clerk at Osage Agency, resigning after a time. In 1934, he was made superintendent of Sells Agency, Arizona, in charge of Gila Bend, Papago and San Zavier Reservations. Hall has engaged in various oil field construction programs.

E. R. BROWN, board chairman of Magnolia Petroleum Company, Dallas, has contributed a fully equipped ambulance to be turned over to the British-American Ambulance Corps for duty in England. He frequently spent his vacations on the British Isles prior to the war.

E. E. HATFIELD, general superintendent Mene Grande Oil Company in Eastern Venezuela, with headquarters at San Tome, is in the United States on vacation. His address is 2500 University Avenue, Fort Worth, while here.

MICHAEL T. HALIBOUTY, consulting geologist and petroleum engineer, discussed "Oil and Gas Stratigraphic Reservoir in the University Oil Field, East Baton Rouge Parish," before the Houston Geological Society last week.

GEORGE R. PINKLEY, consulting geologist, will discuss "The Productive Prospects of Northern Alabama" November 11 before the South Texas Geological Society at San Antonio.

J. S. HAWLEY, assistant purchasing agent for Stanolind Oil & Gas Company, has accepted the chairmanship of the Branch House Division of the Tulsa Community Fund.

BERT E. GAMBLE, land man for Lion Oil Refining Company, has been transferred from El Dorado, Arkansas, to Jackson, Mississippi.

HERBERT STEWART, Los Angeles consulting geologist, is working in the Big Horn Basin area of Wyoming.

HENRY LINAM, president of Standard Oil Company of Venezuela, is in the United States for a brief visit.

FLOYD D. BALLENTINE, 43, superintendent of the land department of Continental Oil Company in the Texas-New Mexico division, died November 1 in a Fort Worth hospital from complications arising from an operation. He was with the company 20 years, starting at Blackwell, Oklahoma.

JOHN PORTER RICHEY, 70, veteran drilling contractor, died November 4 at his home in Tulsa, following a stroke. He started in the industry as a driller 50 years ago in Venango City, Pennsylvania, and was active in Ohio and Indiana before moving to Oklahoma.

V. C. SCOTT, geological department of The Texas Company, has been transferred from Tulsa to Mattoon, Illinois. B. Maxwell Miller has been transferred from Mattoon to replace Scott in the Tulsa office.

JIM KENDALL, engineer for Geophysical Research Corporation, Tulsa, has returned from vacation in New York and Canada during which he gave a paper on "The Transient Resilience of Some Fluids" before the Society of Rheology.

SHERMAN WENGERD, geological department, Shell Oil Company, has been transferred from Tulsa to Wichita, and J. R. Gisburne of the same department, has been moved from North Texas to Tulsa. Frank Mort replaces Gisburne in North Texas.

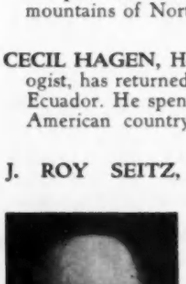
ARTHUR T. SAUNDERS, purchasing agent for Allied Paint Company, Tulsa, has been made vice president of the company and placed on its board of directors. He is also chief chemist and plant superintendent.

JOHN P. KLEP, Sperry-Sun Well Surveying Company, Houston, addressed the Petroleum Engineering Club at A. & M. College of Texas recently on "Well Surveying Methods and Their Application."

L. H. TRUE, assistant manager of Magnolia Pipe Line Company, Dallas, spent the past week seeking big game in the mountains of Northwestern New Mexico.

CECIL HAGEN, Houston consulting geologist, has returned from an assignment in Ecuador. He spent a month in the South American country.

J. ROY SEITZ, geologist for Seitz, Comegys & Seitz, Inc., Wichita Falls, has been elected president of the North Texas Geological Society.



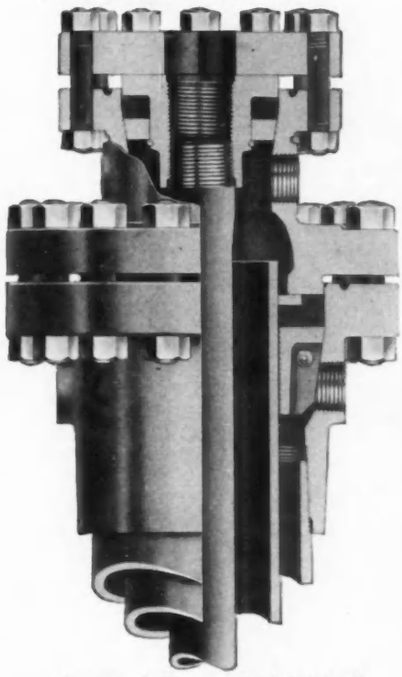
J. J. Russell, Sinclair Prairie Oil Company, was elected vice president, and Joe M. Clark, Tide Water Associated Oil Company, was named secretary-treasurer.

NOTES FOR THE Equipment Buyer and User

Well Heads

CAMERON IRON WORKS, INC.

A series of low-pressure well heads, designed for 1000 pounds working pressure and described as low-cost, has been announced by Cameron Iron Works, Inc., 711 Milby Street, Houston.



Cameron's Type AU Well Head

Type UA is a self-sealing threaded suspension-type tubing hanger which features forged steel casing-head housings, standard API flanges on both casing head and tubing head to permit use of blowout preventer equipment if required, slip suspension of casing, neoprene-asbestos packing above the slips that may be tightened externally at any time, self-sealing tubing hanger with neoprene asbestos packing that may be tightened externally, and nested design to provide low over-all height and to conserve cellar space.

Three other types are available, all readily interchangeable in a single tubing-head housing: Type R is tubing collar-type suspension, type Q is slip suspension, and type RA is slip suspension with packoff below the slips.

Pumping Unit

OIL WELL SUPPLY COMPANY

Two new twin-crank pumping units intended for medium-duty service, described as featuring refinements of construction usually found only in units designed for the most severe pumping service, have been announced by Oil Well Supply Company, Dallas. Designated Models TC-12-H and TC-17, they are identical except for capacities and ratios of reduction gears.

The API polished-rod load capacity is 12,800 pounds and available stroke lengths are 24, 32, 40 and 48 inches. The D-12 double reduction gear of the TC-12-H unit has a 31.9/1 ratio and an API peak torque capacity of 58,000-inch pounds at 20 strokes per minute. The D-17 reduction gear of the TC-17 unit has a 32.15/1 ratio and an API peak torque capacity of 82,000 inch-pounds at 20 strokes per minute.

Both reduction gears comprise heavily ribbed, rigid, cast semi-steel cases with single-helical, heat-treated, forged-steel gears and pinions. The shafts are also heat-treated, and are mounted in heavy-duty, shim-adjustable, tapered roller bearings. Pinions are integral with their shafts. The high-speed and low-speed shafts are equally extended, and a brake with control operates on a drum at one end of the high-speed shaft.

Frames, either short or extended, are of arc-welded structural steel with four-leg derrick-type samson posts. Both arc-type and rubber-cushioned, oilbath, link-type hangers are available. Counterbalanced cranks are standard equipment, and are described as permitting rotary counterbalancing, including the variations of lag or lead needed for most efficient pumping. Cranks clear the floor even when fully equipped with counterweight plates.

Saddle and upper-pitman bearings are oilbath and the crank-pin bearings are grease-pressure lubricated. All bearings are enclosed in weatherproof and oil-tight housings. The pitman equalizer arrangement is of a design to assure full equalization of all pitman loads. Changing stroke lengths is simplified by the use of self-aligning spherical roller bearings on the crank pins combined with a universal bearing arrangement at the top of each pitman.

Lathe

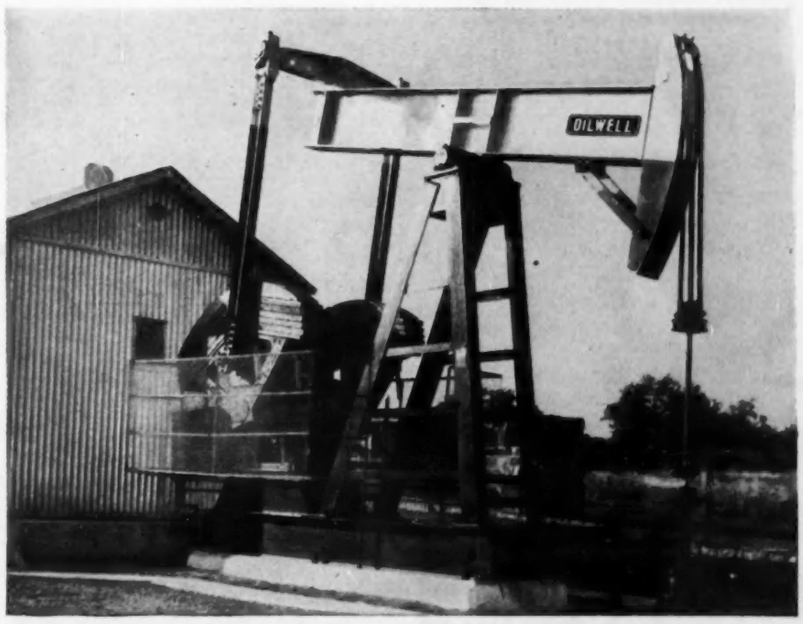
THE OSTER MANUFACTURING COMPANY

A lathe with a capacity of 1½-inch (round) for cutting-off, boring, tapping, reaming, facing, threading and other jobs has been announced by The Oster Manufacturing Company, 2057 East 61 Place, Cleveland.

Oster's Rapiduction Lathe

The machine, designated Rapiduction, is designed primarily as a low-cost lathe for simple turning operations without highly skilled labor. It is equipped with a cross slide and saddle for quick setting up for three operations. Spindle head is totally enclosed, carrying the spindle and worm shaft which runs in oil. The spindle runs on ball bearings and is built with American standard flanged-type nose. It is driven by a hardened and ground, steel work and bronze worm gear. The worm shaft is mounted on ball bearings.

Multiple V-belts from the motor to worm shaft is the method of drive, speed



Oil Well Supply Company's TC-17 Pumping Unit

GET ACCURATE RESULTS
Quickly . . Easily . . with
CURTIN CENTRIFUGES

No. 3480 . . . 100 c.c. machine. Cranks and heads interchangeable with 15 c.c. machines.

You can maintain your required speed for the period of the test with much less effort. Curtin Centrifuges, proven world-wide, are heavy duty, rigidly constructed, and extremely simple in design. Illustrated bulletin, giving full details, available upon request.

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HOUSTON U·S·A TEXAS

The Correct Nut
FOR EVERY FASTENING ON OIL FIELD EQUIPMENT
. . . . all incorporating the Elastic Stop Locking Element

THESE NUTS do not work loose under vibration, hard service, or wear of surrounding parts. And they retain their full locking effectiveness when used over and over again. **Try them on your troublesome fastening jobs...and specify them on new equipment.**

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Elastic Stop SELF-LOCKING NUTS

NOTES FOR THE Equipment Buyer and User

changes being obtainable through quick-change sheaves giving spindle speeds from 140 to 1000 revolutions per minute. A coolant pump, mounted in the base, is driven by a V-belt from the motor.

Mounted on the carriage with Key- and T-bolts, the tool post is provided with longitudinal adjustment for the length of the carriage. A variety of chucking equipment is available, including face plate, automatic and universal, and either manual or automatic stock stop can be provided.

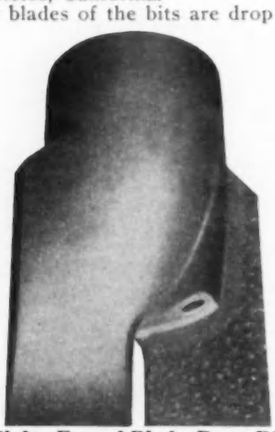
Power is furnished by a 2-horsepower 1800/3600 revolutions per minute, two-speed induction motor with reverse or electric-braking optional.

Drag Bit

GLOBE OIL TOOLS COMPANY

A complete line of forged-blade drag bits, in 2-, 3- and 4-blade styles and in a complete range of sizes, has been announced by Globe Oil Tools Company, Los Nietos, California.

The blades of the bits are drop forgings of selected alloy steel, heavily set with Borium inserts and faced with tube Borium. The bit body is of an alloy steel described as very adaptable to welding and is heat-treated for durability.



Globe Forged-Blade Drag Bit

All heat treating is handled in the company's plant, and every blade is given an individual Brinell test to insure hardness. The bit is designed for ease in replacing worn blades.

Map

STATEWIDE MAP & DRAFTING COMPANY

A paleontological map of the Texas Gulf Coast, covering the area from the Sabine River on the east to the east half of Goliad and Refugio counties and the western line of Gonzales County on the west, and from the south half of Sabine, San Augustine, Angelina, Walker, Grimes and Washington counties to the southern tip of Caldwell and Guadalupe counties, has been announced by Statewide Map & Drafting Company, 803 Lamar, Houston.

It shows all wildcat tests drilled, and gives all available paleontological points. It is to the scale of ½-inch to the mile.

Safety Shoes

LEHIGH SAFETY SHOE COMPANY

Manufacture of its line of Par-Grip safety shoes with a neoprene-treated vamp and special-compound neoprene sole designed to give skid-protection, toe protection and long service where floors are oily, greasey or wet with strong cleaning, compounds, has been announced by Lehigh Safety Shoe Company, Allentown, Pennsylvania.

The sole is made in one flat piece from toe to heel, the construction being designed to double the normal traction area. The sole is moulded in a deep, diamond-shaped grid pattern forming suction cups to grip wet floors like a rubber plunger. It is intended for both indoor and outdoor wear.

The safety sole is available in knee-boot or ankle-boot models, black or white, and with a steel toe box built in for toe protection. The shoes have a leather insole to prevent irritation commonly caused by all-day use of rubber footwear.

Magnetic Starter

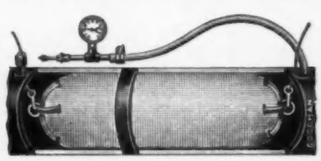
WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY

A new line of across-the-line magnetic starters for use with multi-speed squirrel-cage motors of from 220 to 600 volts, 1- to 100-horsepower, has been announced by Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pennsylvania. They are designed to start the motor across-the-line at any speed, and different speeds are obtained by changing the connections to the motor so as to change its number of poles.

Starters are available for the follow-

Standco NO-SMOKE
STANDCO BRAKE LINING
for the easiest brake known. It "feeds off" evenly. Standco never scores brake rims. See page 2100, Composite Catalog.
Standco Brake Lining Co.
HOUSTON

STOPPERS FOR OIL LINES



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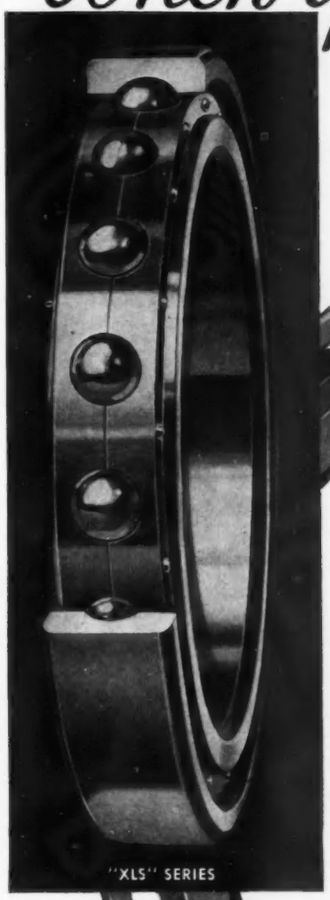
When You're Cramped for Space

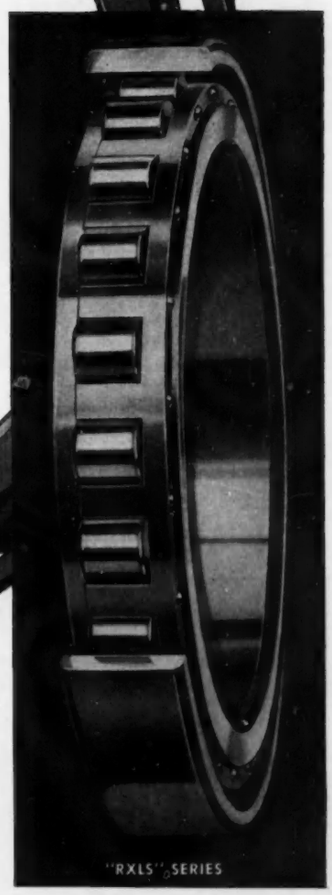
USE THESE VERY LIGHT INCH SERIES BEARINGS



HAVING bores abnormally large, as compared with the outside diameter, they offer definite advantages under certain conditions found in machine design. You may have them in several different types, *affording compactness, light weight, and greater latitude in your design.*

There are several lines of very light type ball bearings, which include the "S" starting at 1/8" bore, and the "XLS" starting at 1 3/8" bore, running up to a maximum of 21" bore and 28" outside diameter. And in very light type roller bearings, there is the "RXLS" Series, paralleling the "XLS" in size range.

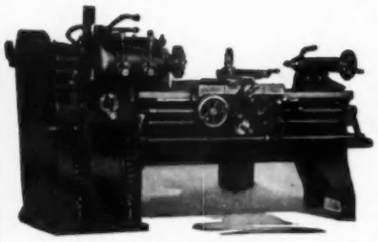
Why not let our engineers tell you more about these Very Light Precision Bearings? Write for the Catalog.



"NORMA-HOFFMANN"

PRECISION BALL, ROLLER AND THRUST BEARINGS

NORMA-HOFFMANN BEARINGS CORP'N.—STAMFORD, CONN., U. S. A.



The Boye & Emmes Timken Bearing Engine Lathe

COMPLETE LINES

Machine Tools—Metal Working Machinery—Bolt and Pipe Threading Machines—Electric Arc Spot and Butt Welders—Hand Power and Electric Traveling Cranes—Foundry and Forge Shop Equipment.

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NOTES FOR THE Equipment Buyer and User

ing types of multi-speed motors in 2-, 3- or 4-speed types: constant horsepower, constant torque, variable torque, single-winding motors and double-winding motors.

Features include push-button speed selection, over-load protection, low-voltage protection, de-ion arc quenchers and front-of-board wiring with accessible terminals. Optional operational features include selective speed control, compelled slow-speed start, automatic sequence acceleration and deceleration. All sizes are available in enclosures for Class II Group G and Class I Group D hazardous locations.

Hacker Machinery & Supply Names W-K-M for Export

Hacker Machinery & Supply Company, Turnertown, Texas, has named W-K-M Company, Houston, as exclusive domestic and export distributor.

Circuit Breakers

Roller-Smith Company 1766 West Market Street, Bethlehem, Pennsylvania, has issued Catalog 3630 describing outdoor oil circuit breakers of 7500-volt rating and 50,000-kva interrupting capacity. The units feature inverted A-frame construction to permit mounting of either wound-primary or bushing type current transformers for easy accessibility; transformers can be replaced without disturbing contact alignment or removing the bushings; terminal bushings are relieved of all closing shocks; piston and cylinder shock absorber are designed to prevent rebounding of contacts on opening, and magnetic blowout and arcing horns minimize arcing time.

Gas-Diesel Engine

Worthington Pump & Machinery Corporation, Harrison, New Jersey, has issued Bulletin S-500-B39, describing its Types EEGX and EEX convertible gas or Diesel engines. They are designed for applications where it is difficult, at the outset, to determine whether a Diesel engine or a gas engine is the more desirable power unit. The conversion from operation on one fuel to the other is brought about by insertion or removal of a spacer ring between each cylinder liner and its cylinder head.

Trenchers

The Buckeye Traction Ditcher Company, Findlay, Ohio, has issued a 4-page bulletin descriptive of its Models 12, 12-A and 48 pipe-line trenchers. Model 12 cuts a trench 15 to 24 inches wide up to 5½ feet deep; Model 12-A cuts a 26-inch trench up to 5½ feet deep, and Model 48 cuts trench 22 to 40 inches wide and 6½, 7½ or 8½ feet deep.

Servicing Pipe Fittings

Oxy-Acetylene Tips, published by The Linde Air Products Company, 30 East 42 Street, New York, in its November issue, contains an illustrated article on "Removing Dutchmen from Salvaged Pipe Fittings." The flame-gouging process is described as permitting control so accurate that threads on the valves and fittings are unmarred by removal of the pipe stubs.

Roller Chain

Morse Chain Company, Ithaca, New York, has issued Catalog R-40 giving 92 pages of engineering data and prices on roller chain. It includes information on construction of channel-lubricated, interchangeable roller chain, details of adaptations and applications, tells how to select the right chain for a particular drive, and gives performance data and engineering data. The bulletin also gives illustrations and specifications of regular and special sprockets with recommendations for their proper use.

V-Belt Drives

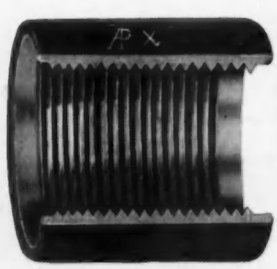
B. F. Goodrich Company, Akron, Ohio, has issued a 170-page "V-Belt Data Book" giving alphabetical listings of belt requirements for industrial machinery, water pumps, gasoline pumps, air compressors, and garage and shop equipment. Listings give the manufacturer's part number, the belt number and its size. The book also gives numerical group listings of belt sizes, a numerical list of belt dimensions for V- and flat-belts, and conversion listings.

Electrical Equipment

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pennsylvania, has issued a new 64-page edition of its "Quick Selector" catalog of electrical equipment for motor, lighting or feeder circuits. It features safety switches, circuit breakers, multibreakers, distribution panelboards, motors and motor controls in successive sections. An index is given on the front cover. Four pages of general application data contain NEC recommended installation practices, simplified and tabulated for easy reference.

Tubular Products

The Babcock & Wilcox Tube Company, 19 Rector Street, New York, has issued Technical Bulletin 11-C giving specifications for seamless tubular products. It contains specifications established for carbon steel and alloy steel tubes by the American Society for Testing Materials and the Association of American Railways, and specifications established by the company for high



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Our special patented process of recessing "XL" Couplings assures perfect alignment, tighter joints and protection of vanishing threads—giving longer life to the line. Made in strict accordance with A.P.I. standards in all sizes. Microscopically tested by a J.-&-L. Comparator to insure maximum accuracy.

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WHEELING MACHINE PRODUCTS CO.
WHEELING WEST VIRGINIA

9 Years in the Oil Industry...

And NEOPRENE'S Job is Still GROWING!

(1) Rugged Neoprene cups are used throughout this Valve-in-Head Packer. They do an effective sealing job against oil and mud even under tremendous pressure.

NEOPRENE first went to work in the oil industry nine years ago. Since then, the amount of neoprene used by the industry has increased tremendously. Nowadays you'll find this remarkable chemical rubber serving all the great oil-producing fields . . . at the vital points of more tools and equipment than ever before. Why? Because neoprene's value has been tested by time . . . proved by continuous grueling use.

Neoprene has all the strength, resiliency and toughness of natural rubber —*plus* resistance to oil, heat, gasoline, oxidation, sunlight, aging and corrosive acids and gases. For better and longer service, specify neoprene. You'll make money on increased efficiency . . . you'll save on lowered overhead. Du Pont, Rubber Chemicals Division, Wilmington, Delaware.

(2) Neoprene pistons and valve inserts are essential to the operation of this Vertical Pump. These neoprene parts are in constant contact with corroding acids and oil.

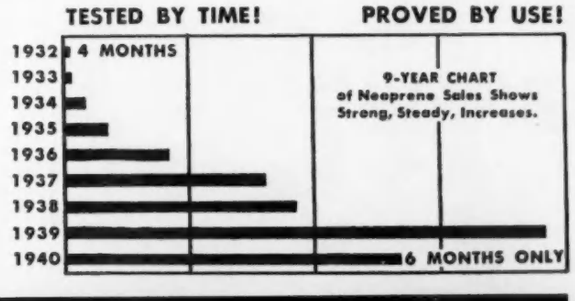
(3) Neoprene protects every vital point of this Gas Lift System. In spite of sulphur gas, high pressures and oil, these neoprene elements keep their strength and resiliency.

(4) 41 neoprene parts serve this Gun Perforator. To do their job, they must withstand shock, oil, heat, and excessive pressure.

The Petroleum Industry uses **NEOPRENE** *for:*

Bearings	Laboratory equipment
Belts	Linings, tank and pipe
Cables, electrical	Oil savers
Christmas tree seals	Packers, all types
Clothing	Packing elements
Diaphragms, plain and cloth inserted	Pistons, all types
	Paint
Footwear, soles, heels, boots	Seals, all types
	Slush pump valve rubber
Gaskets, plain and cloth inserted	Tubing head strippers
	Valve seats, inserts, seals
Hose, of all types	

SEE OUR EXHIBIT AT NATIONAL METAL EXPOSITION, CLEVELAND, OCT. 21-25



DU PONT
NEOPRENE
the chemical rubber

NOTES FOR THE Equipment Buyer and User

chrome and stainless alloy tubes. Specifications cover manufacture, finish and workmanship, chemical and physical properties, tests, and permissible variations in weights and dimensions of tubes and pipe.

Paint

Industrial Paint Clinic, division of American-Marietta Company, 43 East Ohio Street, Chicago, has issued a "Maintenance Painting Handbook," containing 120 pages describing 42 specialized paint products and suggestions for their application.

Water Purification

Worthington Pump & Machinery Corporation, Harrison, New Jersey, has issued Bulletin W-210-B26 on its pressure filters for water purification. It describes construction and operating features and is illustrated by photographs and line-drawings.

Roller Bearings

SKF Industries, Inc., Philadelphia, has issued a 36-page catalog on its line of spherical roller bearings. It illustrates applications in oil, mining, crushing, steel, paper, railroad and allied fields, and includes information on bearing selection and drawings of types of roller bearing design.

Gaskets

Goetze Gasket & Packing Company, New Brunswick, New Jersey, has issued a 64-page handbook and catalog on industrial gaskets. Designated Catalog 53 and making obsolete all previous literature of the company, it contains advanced engineering data, shows new and improved products and gives complete size and price information.

Regulators

Foster Engineering Company, 109 Monroe Street, Newark, New Jersey, has issued Bulletin 33 on "Capacities of Foster Pressure Regulators for Steam," giving the information in table form in pounds of saturated steam per hour for various initial and reduced pressures, and Bulletin 35 on "Capacities of Foster Pressure Regulators for Gases," showing tables in cubic feet of free gas per minute for various initial and reduced pressures.

Diesel Use

"International Power," house magazine published by International Harvester Company, 180 North Michigan Avenue, Chicago, contains in its current issue a discussion of "Multi-Cylinder Engines for Oil-Field Service" by E. A. Braker, industrial power sales engineer for the company.

Drilling Rig

The National Supply Company, Toledo, Ohio, has issued Bulletin 284 describing its Type 75 Consolidated Rig. It is designed to accommodate two internal combustion engines having a maximum combined nominal input of 500 horsepower to the drawworks and for drilling operations to 7500 feet using 4½-inch drill pipe. The complete rig includes Type 75 drawworks and transmission unit, two-engine drive units, and a main subframe to support all units as a group and maintain proper alignment. Provision is made for compounding the two engines so that their combined power may be used for hoisting operations, or for driving the rotary machine and slush pump at their required speeds while drilling.

Wire Cloth

Wickwire Spencer Steel Company, 500 Fifth Avenue, New York, has issued a 48-page catalog describing its line of industrial wire cloth and woven-wire screens. It contains 151 illustrations, charts, graphs and diagrams and gives other information to facilitate selection of wire cloth for a given assignment.

Industrial Pumps

American Manganese Steel Division of The American Brake Shoe & Foundry Company, Chicago Heights, Illinois, has issued Bulletin 940 on Amsco-Nagle industrial pumps. Describing 5 types in 18 sizes, it discusses a line of horizontal and vertical shaft centrifugal pumps from ¾ to 16 inches in size.

"Dat's de foist lock I ever saw I couldn't pick!"

Goetze
GASKETS
New GASKET
Handbook and Catalog
64 fact-packed pages of advanced engineering data . . . complete size and price information . . . many new and improved products . . . profusely illustrated . . . concisely written . . . to offer time-saving reference.
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28 Allen Avenue, New Brunswick, N. J.
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"America's Oldest and Largest Industrial Gasket Manufacturer"

Squeaks from the Bull Wheel

Gittin' Scared

An aged man at the Union Station discussed the business situation. I said that things were mighty bad, and, somehow or other, it made him mad. The aged man, he tapped my knee.

"D'ye know what's wrong with things?" said he. "I've been in fights," and the old boy glared, "and allus got whipped—when I got scared.

"Folks has forgot how to stand and grin when hard luck knocks 'em on the chin. There's too much groanin'—not enough laughs—too many crepe hangers, too; too many graphs. It sure doesn't help a sick man's heart to think of nothin' but his fever chart.

"There's too many experts tellin' how come the whole bloomin' world is on the bum. There's too many people with an alibi—I'd sooner listen to a big lie. As soon as folks quit hangin' crepe, you'll see business comin' in better shape.

"I've got no use for golf as a game, but I speak the language just the same. There's too many drives, an' too many putts; plenty cold feet, and not enough shots. You ain't my son, but if you was mine, I'd mighty quick teach you not to whine."

He wasn't cultured, and his words were tough; but the old boy seemed to know his stuff.

—From Friendly Cheer.

Well Trained

Hard-boiled Drill Sergeant (to married recruit)—Button yer coat.

Recruit (absently)—Yes, dear.

Law of Gravity

"Did you hear that when old Robinson returned from abroad, he fell on his face and kissed the ground of his native town?"

"Emotion?"

"No—banana skin."

Well Matched

The boys were discussing the impending marriage of a buddy.

"That's an accomplished girl Ben is going to marry," observed one. "She can swim, ride, dance, drive a car, and pilot a plane; a real all-around girl."

"They should get along fine," replied another. "You know Ben is a good cook."

Stirring Thoughts

Soon after the arrival of her first baby, a mother went upstairs and found her husband standing by the side of the crib and gazing earnestly at the child. Tears filled her eyes. Her arm stole round his neck as she rubbed her cheek caressingly against his shoulder.

He started slightly at the touch.

"Darling," he murmured, dreamily, "it's incomprehensible to me how they can sell such a crib as that for $3."

Slightly Misunderstood

The teacher had told the class all about Diogenes, emphasizing the fact that he lived for many years in a tub.

"I'll bet my dad wishes he was Diogenes," Tommy remarked.

"But surely your father wouldn't like to live in a tub for years, Tommy."

"Sorry, miss," Tommy replied, "I thought you said pub."

Ouch

What did the first rheumatism pain say to the second rheumatism pain?

I don't know. What?

Let's get out of this joint.

Willing to Help

The mistress of the house was explaining the household duties to the new maid.

"This," she said in awed tones, "is a very valuable Persian rug." She paused, and added: "I want you to be very careful when you clean it, as it is very old and has been in the family for many generations."

The new maid nodded understandingly.

"I can quite see it's old ma'am," she replied, "but I dare say we can make it last through the winter if we're careful."

Susceptible to Ailments

I see here by the paper that Mr. So and So, the octogenarian, is dead. Now what on earth is an octogenarian?

Search me, but they seem to be a sickly lot. You never hear of one but he's dying.

One Exception

"You can take it from me, that if you want to get on, you must start from the bottom."

"How about swimming?"

Bad Case

"How's your wife's mental condition since the psychiatrist has been treating her?"

"She's better, but the psychiatrist went nuts."

Obstacles

Artist—I'll give you five dollars if you'll let me paint you.

Mountaineer—Wal, I dunno . . .

It's easy money.

Hain't no question 'bout that. I wuz jes' a-wonderin' how I'd get the paint off afterwards.

Breakfast

The traveling man walked into the dining room of the hotel, and sat down. It was breakfast time and the waitress came to take his order.

"Young woman," he said, "listen carefully, because I want this breakfast just exactly like I order it. See? First, I want some toast. Burn it black on one side, and don't cook it at all on the other. Then I want some scrambled eggs. Stir them 'til they get full of lumps, and then burn 'em. And I want some weak coffee, and I want it served lukewarm."

The waitress listened in wonder.

"You don't really want that, do you?" she demanded.

"I sure do," he said, "Just that way."

So she came back after a while and set his breakfast down in front of him.

"Anything else?" she queried.

"There is," he said. "Sit down there opposite me, muss your hair all up and start nagging at me."

"Mister,' demanded the waitress. "Are you drunk or crazy?"

"Neither," said the traveling man. "I'm homesick!"

GIVE YOUR WELLS the Works!

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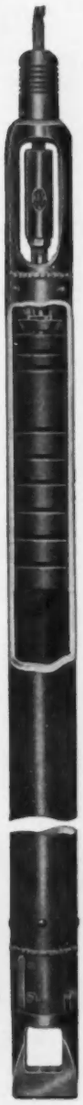

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INDEX TO ADVERTISERS

*** Indicates that detailed information on the manufacturer's products or services may be found in the 1940 edition of the Composite Catalog of Oil Field & Pipe Line Equipment.**

A

	Page
*Abercrombie Pump Co.	—
*Acme Fishing Tool Co.	—
*Advanced Petroleum Equipment Corp.	—
Ainsworth Brothers, Inc.	89
Air Reduction Sales Co.	8
*Ajax Iron Works	—
*Alten's Foundry & Machine Works	—
*Aluminum Company of America. Third Cover	
Aluminum Ore Co.	—
American Assn. of Petroleum Geologists.	—
*American Cable Division of American Chain & Cable Co.	—
American Cast Iron Pipe Co.	106
*American Hammered Piston Ring Division of Koppers Co.	—
*American Iron & Machine Works Co.	—
American Locomotive Co.	31
*American Meter Co.	37
*American Sand-Banum Co.	88
*American Steel & Wire Co.	39
Atlas Drop Forge Co.	—
Atlas Supply Co.	—
*Axelson Manufacturing Co.	—

B

*Baash-Ross Tool Co.	5
*Baker Oil Tools, Inc.	3
Baldwin De La Vergne Sales Corp.	94
*Baldwin-Duckworth Division of Chain Belt Co.	61
*Baroid Sales Division	34-35
William M. Barret, Inc.	108
*The Barrett Co.	—
*Bartlett-Hayward Division of Koppers Co.	—
*Bethlehem Steel Co.	Second Cover
*Bethlehem Supply Co.	—
*Braden Steel Corp.	—
*The Brewster Co.	—
The Bridgeport Machine Co.	—
*Broderick & Bascom Rope Co.	—
*Brown Oil Tools, Inc.	—
*The Buckeye Traction Ditcher Co.	—
Bucyrus-Erie Co.	—
*The Buda Co.	—
*Butler Manufacturing Co.	—
*Byron Jackson Co.	—

C

Jo H. Cable	—
Cameron Iron Works	45
*Cardwell Manufacturing Co.	—
Carnegie-Illinois Steel Corp.	—
*J. I. Case Co.	—
*Caterpillar Tractor Co.	27
*The Cavins Co.	—
*Chain Belt Co.	—
*Clark Bros. Co.	—
*Climax Molybdenum Co.	—
*Coffing Hoist Co.	—
Columbia Steel Co.	39
Columbian Steel Tank Co.	47
*Continental Motors Corp.	—
Continental Oil Co.	97
The Continental Supply Co.	41
*Fred E. Cooper Co.	—
*The Cooper-Bessemer Corp.	29
*Crane Co.	69
W. H. Curtin Co.	116

D

*Darling Valve & Manufacturing Co.	110
Dedman Foundry & Machine Co.	86
*Diamond Chain & Manufacturing Co.	—
*Dixon Valve and Coupling Co.	—
*Dowell Incorporated	—
*The Dragon Manufacturing Co.	—
*E. I. du Pont de Nemours & Co.	119

E

*Eastman Oil Well Survey Co.	—
Economy Electric Lantern Co.	—
Elastic Stop Nut Corp.	116
*Engineering Laboratories, Inc.	—

F

Failing Exploration & Drilling Co.	—
First National Bank in Houston	—
First National Bank & Trust Co. of Tulsa	—
Fluid Packed Pump Co.	—
Ford Motor Co.	63
The Fort Worth Clearing House Assn.	—
The Fort Worth Laboratories	108
Fort Worth Steel & Machinery Co.	—
*Franks Manufacturing Corp.	—
Frick-Reid Supply Corp.	—
Frost National Bank	—

G

*Gardner-Denver Co.	73
*The Garlock Packing Co.	—
*Gaso Pump & Burner Manufacturing Co.	85
*Gatke Corp.	95
*General Electric Co.	—
General Geophysical Co.	—
General Motors Sales Corp.	—
Geophysical Service, Inc.	—
Goetze Gasket & Packing Co.	120
*Goodyear Tire & Rubber Co.	—
*H. P. Gott Manufacturing Co.	—
*Gray Tool Co.	—
*Green Head Bit & Supply Co.	—
*The Guiberson Corp.	—
Gulf Coast Laboratories	108
Gulf Envelope Co.	—
Gulf Oil Corp.	—
Gulf Publishing Co.	—
Gunter Hotel	—

H

*Halliburton Oil Well Cementing Co.	—
Hardway & Cathey	108
C. J. Harter, Machinery	118
*Haynes Stellite Co.	83
*Hazard Wire Rope Division of American Chain & Cable Co.	—
Heldie's Machine Works	—
The Hercules Powder Co.	—
*Hewitt Rubber Corp.	—
Hilton Hotel	108
*Hobbs Manufacturing Co.	—
Hollywood Plaza Hotel	112
Houston Laboratories	108
Houston Pipe Appliances Co.	—
*Hughes Tool Co.	First Cover
Humble Oil & Refining Co.	50-51
*Hunt Tool Co.	49
Hyatt Bearings Division	—

I

Independent Exploration Co.	—
*Ingersoll-Rand Co.	107
*International Harvester Co.	—
*The International Nickel Co.	—

J

Jarecki Manufacturing Co.	—
*Jensen Brothers Manufacturing Co.	—
*Johns-Manville	76
*M. O. Johnston Oil Field Service Corp.	—
*Jones & Laughlin Steel Corp.	—

K

*Kerotest Manufacturing Co.	—
*Keuffel and Esser Co.	—
*Kibele Manufacturing Co.	—
*Kinzbach Tool Co.	—
*Koppers Co.	—

L

Landis Machine Co.	91
*Lane-Wells Company	67
*Larkin Packer Co.	10
The Thomas Laughlin Co.	82
*The Layne & Bowler Co.	—
Lebanon Steel Foundry	—
*Le Roi Co.	—
*A. Leschen & Sons Rope Co.	—
*The Lincoln Electric Co.	—
*Link Belt Co.	87 and 89
Lone Star Cement Corp.	—
*Lucey Boiler & Manufacturing Co.	—
*Lucey Export Corporation	58
*The Ludlow Valve Manufacturing Co.	—
*Lufkin Foundry & Machine Co.	—

M

Macwhyte Co.	—
*Maintenance Engineering Corp.	90
P. R. Mallory & Co., Inc.	—
The Marley Co.	—
Marmon-Herrington Co.	—
*John N. Martin, Manufacturer	—
*McEvoy Co.	—
McKissick Products Corp.	—
*Merco Nordstrom Valve Co. Insert, 42-43	
*Merla Tool Corp.	—
*Metric Metal Works	37
*Miller Sand Pump Co.	121
*Minneapolis-Moline Power Implements Co.	—
*Mission Manufacturing Co. Fourth Cover	
*Morse Chain Co.	—
Mott-Smith Corp.	118
Mudrite Chemicals, Inc.	—
The Jno. Muller Co.	—
Murray Rubber Co.	—

N

National Bank of Tulsa	—
*National Lead Co.	34-35
The National Supply Co.	—
National Tube Co.	—
Norma-Hoffman Bearings Corp.	117
Norvell-Wilder Supply Co.	4
*Novo Engine Co.	—

O

*Oil Center Tool Co.	—
*Oil City Brass Works	—
Oil Well Supply Co.	—
*Otis Pressure Control, Inc.	—

P

*The Parkersburg Rig & Reel Co.	—
*Patterson-Ballagh Corp.	113
*Pelican Well Tool & Supply Co.	92
Petroleum Electric Power Assn.	—
Petroleum Rectifying Co. of California	53
*Pittsburgh Equitable Meter Co. Insert, 42-43	
*Pittsburgh Steel Co.	—
Plymouth Cordage Co.	—

Q

*Quaker Rubber Corp.	—

R

Reading-Pratt & Cady Division of American Chain & Cable Co.	—
*Rector Well Equipment Co.	106
*Reda Pump Co.	103
*Reed Roller Bit Co.	114
*Regan Forge & Engineering Co.	—
*Republic Steel Corp.	—
*The Ridge Tool Co.	88
John A. Roebling's Sons Co.	—

S

Safety Gas Main Stopper Co.	116
Jack A. Schley	108
*Schlumberger Well Surveying Corp.	33
The Second National Bank of Houston	6
*Security Engineering Co.	120
Seismic Exploration Co.	—
Seismograph Service Corp.	—
*Shaffer Tool Works	—
Shell Development Co.	109
Shell Oil Co., Inc.	—
Shilstone Testing Laboratory, Inc.	108
Skelly Oil Co.	84
*SKF Industries, Inc.	105
A. O. Smith Corp.	57
*E. M. Smith Co.	78
Howard Smith Co.	79
*South Chester Tube Co.	55
Southern Engine & Pump Co.	72
Southern Pacific Lines	—
Spang Chalfant, Inc.	—
*Spang & Company	—
*Sperry-Sun Well Surveying Co.	64-65
Standard Supply and Hardware Co.	—
*Standco Brake Lining Co.	116
*Star Drilling Machine Co.	—
Straus-Bodenheimer Co.	—

T

E. C. Tecktonius Manufacturing Co.	—
*Templeton, Kenly & Co.	93
Texaco Development Corp.	—
The Texas Co.	—
Texas Electric Steel Casting Co.	—
The Thermoid Co.	—
Thompson Tool Co.	—
*Thornhill-Craver Co.	—
*The Timken Roller Bearing Co.	—
Edgar Tobin Aerial Surveys	96
*Tretolite Co.	—
Trinity Portland Cement Co.	—
Tulsa Shock Absorber Co.	—
*Twin Disc Clutch Co.	—

U

*Union Wire Rope Corp.	101
*Union Carbide & Carbon Corp.	83
*Unit Rig and Equipment Co.	—
*United States Rubber Co.	—
United States Steel Corp.	39
*Universal Atlas Cement Co.	—
Universal Engineering Co.	99

W

P. A. Ward & Co.	112
Warner & Swasey Co.	—
*Waukesha Motor Co.	—
*Well Machinery & Supply Co.	—
Well Surveys, Inc.	—
Western Electric Co.	—
*Westinghouse Electric & Manufacturing Co.	99
*Wheeling Machine Products Co.	118
*The Wheland Co.	77
White Plaza Hotel	108
Wichita Engineering Co.	—
*Wickwire Spencer Steel Co.	—
Williams Brothers Corp.	81
*J. H. Williams & Co.	88
*Wilson Manufacturing Co.	7
*Wilson Supply Co.	—
Witte Engine Works	89
*Worthington Pump & Machinery Corp.	74
Wyatt Metal & Boiler Works	—

Y

Youngstown Sheet & Tube Co.	—